REPORT

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The merits of a consumption approach to agricultural emissions

Compared with emissions trading

Prepared for MLA

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The issue

- **The potential for full coverage of agriculture within an emissions trading scheme (ETS) – or coverage in mitigation policy in general – poses a number of challenges for the red meat industry. One of these is to consider whether different mechanisms for the inclusion of agriculture have significantly different outcomes for the industry, or whether different mechanisms ultimately involve the same sets of challenges.**
- **This report considers the merits and consequences of a so called 'consumption approach' to climate mitigation.**

The consumption approach...

- **The consumption approach has been proposed as an economy-wide and global mechanism to deal specifically with the trade competitiveness issues that arise when a production approach is applied to the world with partial coverage.**
- **Given the export and emissions intensity of much of the meat industry, the prospect of an approach which avoids unnecessary trade effects is in many ways attractive – although trade competitiveness is not the only consideration for agriculture when it comes to mitigation policy.**

...could be applied economywide

- **The consumption approach as applied to agriculture can be thought of at two broad levels; as an economy-wide alternative to the proposed Carbon Pollution Reduction Scheme (CPRS), or as a mechanism specifically for agriculture in conjunction with the CPRS as applied to other industries.**
- **As a fully fledged alternative to the CPRS, the consumption approach would have the benefit of avoiding both direct and indirect input cost imposts on the industry. This would, however, involve a fundamentally different mitigation philosophy to that currently embedded in the CPRS and most international discussions.**

... or as a measure targeted at agriculture

- As a partial measure applied only to agriculture, a consumption approach maintains some trade and competitiveness benefits, but it does not avoid the *indirect* cost imposts of imposing a carbon price on the economy.
- The consumption approach as an adjunct to the CRPS goes some way towards dealing with uncertainties about incomplete global coverage of mitigation policy as it does not involve a direct emission cost for producers.

A consumption approach may result in lower costs to the industry...

- Because the consumption approach would only apply to a proportion of what is currently recognised as Australia's agricultural emissions (ie, that proportion associated with domestic consumption), the question of agriculture's 'target' within the overall mitigation policy arises.
- A consumption tax calibrated to impose the same revenue (in terms of the cost of emission permits) would result in lower output and value of production loses that would occur under the CPRS.
- This arises because of a large tax imposed on consumption and because the industry is able to switch production to the export market.

... but not if there is global coverage

- Global coverage of a consumption approach is likely to emphasise that red meat is an emissions intensive production which is likely to suffer a reduction in relative demand. This will be less severe for Australia if it is less emissions intensive than other producers. The most likely outcome, however, is for the same reduction in production as under a traditional production approach.
- If other countries also impose a consumption tax, there will be increased availability of product on the export market leading to decreased returns to Australia, effectively tax Australian production, but without any of the revenue accruing in Australia.

Australian exports will increase

- An Australian consumption tax on agriculture is likely to lead to a relative increase in exports (relative to BAU). Ironically, this will appear to competitors as an increase in Australian competitiveness (through a price reduction). While the question of trade responses to greenhouse issues is a vexed on, there is a possibility that competitor countries will respond with trade measures.

A transitional measure

- **A consumption approach could be viewed as a transitional measure while the industry develops approaches to mitigations. In this case, however, careful consideration needs to be given to the long term consequences of high taxes on consumption.**

But fundamental issues will remain

- **In either world — an economywide consumption tax or one imposed on agriculture only — the most substantive issue for the read meat industry, how to reduce emissions intensity, remains the same. Indeed, if offsets turn out to be an effective form of industry abatement, then an ETS has considerable merit.**
- **A crucial question then becomes one of how the mitigation price incentives intersect with the broader agricultural research agenda.**

1 Introduction: a carbon price and the meat industry

The issue

The Commonwealth Government intends to introduce an emissions trading scheme (ETS) as a major mechanism for establishing a price on carbon in the Australian economy and as a major pillar in climate policy in general.

The scheme (termed the CPRS) now before Parliament does not currently include agricultural producers as covered entities (that is, entities that are required to report on their emissions and to remit permits to cover those emissions), although it does include a number of processing activities. Agriculture is, of course, indirectly affected by the price of carbon established in the economy.

The government is predisposed towards including primary agricultural production in the CPRS by 2015, although it has not made a firm decision on this and is considering a number of different ways of including agriculture.

This paper considers whether a so called 'consumption approach' to carbon pricing (and domestic greenhouse gas mitigation) would be of benefit to the red meat industry given the real possibility that it will be covered in some way by 2015.

This report

We address this question in 4 stages. First, we recap the ways in which the standard approach (an ETS) will affect the red meat industry — in particular the key challenges that this policy implies.

Second, we examine the mechanics of a consumption approach to greenhouse gas mitigation and considers how it differs from the ETS or 'production approach'.

Third, we consider what is lost and what is gained from the point of view of the red meat industry in adopting a consumption approach versus an ETS.

Finally, we provide some illustrative simulations to examine some of the effects of a partial consumption approach.

2 *Recap: an ETS an the meat and livestock industry*

The detailed potential impacts of the CPRS on the red meat industry have been examined in detail in a number of previous CIE reports (CIE 2009a, CIE 2009b and Jiang et al 2009).

The key points that emerge from these analyses are:

- The CPRS involves two channels of cost imposts on the industry. First, even without full coverage, the cost of carbon in other sectors of the economy works it way through to a range of industry input costs. Second, the requirement to remit permits to covered measured emissions involves a significant cost burden.
- If similar costs are not imposed in competitor countries, there is potentially a significant loss of competitiveness for the Australian industry that is not directly related to emissions reductions. This is the 'emissions intensive trade exposed' (EITE) problem.
- There are currently limited options for the industry to reduce emissions from enteric fermentation. These options are costly, and require further clarification.
- Offsets of various kinds (including tree planting) are a potential mitigation option for the industry, but these offsets themselves involve risk that requires careful management.
- Other potential offsets (such as soil carbon and pasture management in the grass fed industry) require further development of accounting standards before they can be implemented with an ETS.

Production cost increases

The cascading of carbon costs throughout the economy is an important and deliberate feature of emissions trading. It means that in each point of various production processes — and at the point of final consumption — producers and consumers need to make careful choices about their production techniques and consumption choices. The increase in the relative price of carbon intensive products is deliberately designed to encourage producers and consumers to switch to less carbon intensive ways of doing things.

The final incidence of these costs — who actually bears the burden — will depend on a large number of technical and market factors. Ultimately, the cost will be shared

between producers and consumers. In a world of partial coverage, a higher burden of these cost increases will be borne by trade exposed industries — the EITE problem.

But even with global coverage, the most significant adjustment costs will be faced by the industries with the least ability to change production methods. In the short term, these industries may not be able to adjust production methods and face a choice of either purchasing permits to cover emissions, or reducing production (or some combination).

The EITE issue

In a global scheme with full activity and country coverage, there would be no EITE issue — whether the scheme was production based or consumption based. The EITE issue is a consequence of Australia establishing a carbon price ahead of trading partners and competitor suppliers in particular industries. The problem is not necessarily that these competitors do not establish emissions trading, but that producers in competing countries do not face a carbon cost.

The policy problem is not necessarily that the EITE industries contract *per se* (although this may be a problem if industries that are expected to expand under a global scheme actually contract under the domestic scheme), it is that they contract in Australia without a net reduction in global emissions (or with a smaller net reduction than the gross reduction in Australia).

This is the problem of *leakage*, which has two manifestations. First, it may involve activities actually relocating overseas, a kind of leakage from movement. Second, leakage can also occur without any movement of activities, but simply through substitution of Australian made products (which do face a carbon price) for competitor products (which do not).

A related policy problem is that if industries contract as a consequence of the Australian scheme that would *otherwise expand* under a global scheme, the Australian policy is not consistent with the emergence of a global scheme. Alternatively, the Australian scheme may result in industries contracting too rapidly compared with what they would under a global scheme. This is potentially a significant issue for Australian red meat to the extent that Australian production is less emissions intensive than production of competitors.

Economywide modelling seems to indicate that, while leakage is small in aggregate, it is very significant for the particular industries concerned. CIE estimates for the red meat industry suggest that leakage (in terms of production, rather than emissions per se) is around 20 per cent for beef and of 30 per cent for sheepmeat (CIE 2009b).

Options for dealing with the EITE problem within the CPRS

While Australia has in place a carbon constraint not faced by significant trading partners and competitors, the EITE problem cannot be 'solved'. Measures to address the potential effects of a domestic carbon price scheme on trade will inevitably be limited in what they can achieve. The fact that a carbon price will lead to pressure on trade flows means that, even with policies to compensate particular industries, this pressure will, in effect, come out somewhere. Domestic measures to address the fact that trade competitors do not yet impose a carbon price cannot change the fact that this price has not been imposed. Rather, domestic measures will involve a transfer from one group of Australians to another.

Given this, there will always be significant tradeoffs involved in the choice of measures to deal with the EITE issue.

The approach adopted in the CPRS is to provide a free allocation of permits to EITE activities that are above particular emission intensity thresholds. Only partial compensation is proposed, and this declines over time. This particular framework is essentially pragmatic.

This is, of course, an option for dealing with the EITE issue that will face the red meat industry should agriculture be covered in the CPRS. Indeed, it seems reasonable that the meat industry would be treated as and EITE industry if it were to be included in the CPRS.

Limited abatement options

It is well understood that with current technologies, there are limited options for the red meat industry to reduce emissions — particularly from enteric fermentation which is by far the largest source of emissions in the production chain.

Of course, under emissions trading, any individual activity does not necessarily have to reduce emissions — the firm can purchase permits to cover emissions. However, as permit prices are expected to increase over time, a firm with limited adjustment options *now* would only purchase permits (rather than reducing production) in the expectation of future technologies that would allow abatement (or future offsets, as discussed below).

Indeed, under emissions trading there is likely to be a futures market in permit prices (there is already such a market in Europe, for example) which will provide a very strong signal *today* about the need for abatement technologies in the *future*.

The challenge for the meat industry is in managing the timing and resources devoted technical change to allow for abatement. It is important to note that this issue arises:

- even under full global coverage — it is related to, but independent of the EITE issue; and

- whether a global production or consumption approach to mitigation is used.

Offsets

It also well recognised that there may be abatement options for the industry that are outside direct meat production, but still associated with underlying producer activities. These are offsets, or permit generating activities, such as forestry or — potentially — soil carbon.

There are two substantive issues with these offsets. First, as well as potentially creating permits, offsets involve a risk — fires destroying forests (or dust storms removing soil carbon). This risk must be carefully managed. The risk is independent of the particular way in which the carbon price is introduced (ETS or tax) but different mitigation schemes may involve better ways of managing the risk from the point of view of an individual producer. Permit trading, for example, can allow a natural hedge through the use futures contracts.

Second, some approaches to offsets — such as soil carbon — require advanced and detail carbon accounting standards — some of which are still under development and international negotiation. Their incorporation will be a challenge regardless of the particular carbon pricing approaches adopted.

Economywide issues

As well as agriculture and red meat issues arising from their coverage under and ETS, there are also a number of contrasting economywide considerations which are likely to be of major concern to the government.

Burden sharing and economic efficiency

The issue of burden sharing was noted above, and it is an important one. One of the in principle reasons for considering the full coverage of agriculture is simply to ensure that all emitting activities face the same marginal cost of abatement. This is fair in that all sectors are then responsible for abatement and (at least in principle) efficient in that it is likely to lead to the lowest aggregate economywide cost of abatement.

Burden sharing and efficiency arguments are very complex when practical considerations are brought to bear. An important starting principle, however, is that violations to uniform treatment and coverage require very sound justification.

Consistency with international obligations

The Government appears to consider that a quantitative cap and trade approach best aligns with Australia's international obligations — which are likely to involve specific abatement targets. Any deviation from this approach for subsets of the Australian economy will create challenges in managing Australia's overall response.

3 How a consumption tax would affect the industry

The idea behind a consumption approach

In a series of discussion papers and newspaper articles, Geoff Carmody has recently proposed a significantly different approach to emissions reduction to the CPRS, based around a consumption model (Carmody 2008a, 2008b, 2008c)[1].

The core idea behind the consumption based scheme is to target emissions embodied in consumption rather than in production. There is a direct analogy between this idea and the GST, as a tax that is ultimately levied on final consumers of the good. Whereas the amount of tax paid in the GST is related to value added, in the case of emissions the amount of tax would be related to the carbon embodied in the goods consumed (see below).

This consumption tax would encourage consumers to change the mix of products they consume and to effectively shift from carbon intensive bundles of consumption to less carbon intensive consumption. Producers will, of course, be affected by these choices — as consumption choices change, producers will need to find less carbon intensive ways of producing in order to maintain sales. Producers with limited options for adjustment will face the same problem with a consumption approach — their technical challenges for low carbon production do not change.

Globally, greenhouse emissions production equals emissions consumption (emissions exports equals emissions imports). Because most discussion of mitigation responses assumes global action (at least in the long term), the distinction between production and consumption is generally not made explicit. If all nations implement an emissions price at the same time, then targeting production or consumption amounts to the same thing[2].

However, this is not what is likely to happen, so targeting production or consumption makes a very significant difference. Because:

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[1] General arguments for taxes rather than emissions trading have been mounted a number of analysts, notably the US economist William Nordhaus (Nordhaus 2008).

[2] There are likely to be slightly different revenue implications however.

- national emissions production includes local production and exports, but not imports; and
- national emissions consumption includes local production and imports, but excludes exports;

then if nations do not implement an emissions price at the same time, a production approach is not trade neutral. It taxes exports and does not tax imports. In a world in which nations adopt emissions policies at different times (and possibly at different rates) this lack of trade neutrality becomes an additional cost to the industries involved — without necessarily any reduction in emissions.

The problem is that, when nations act at different times or to different degrees, a production approach undermines trade competitiveness of early movers compared with others.

A consumption approach, in contrast, is trade competitiveness-neutral. Imports are priced the same as domestically produced substitutes. Exports are affected only when ultimately received as imports in the destination country. National concerns about 'carbon leakage' and job losses are eliminated. National efforts in reducing emissions count as net contributions to lower global emissions. Emissions are not 'exported'. Nations can act unilaterally.

How would it work in practice?

A key feature of a consumption approach is that it could work through the existing GST system — using existing BAS and associated facilities. Most relevant entities are already covered by this system.

The consumption approach would involve a GST surcharge, imposed according to the carbon intensity of a particular product. This is, in effect, a differential GST rate, where the differences are determined by relative carbon intensity.

Under this formulation, the GST surcharge rate would be equal to the *carbon price* multiplied by *the average emissions intensity for a particular product group*, all divided by the *GST exclusive product price*. The GST for any particular product would then be equal to the current GST rate plus the surcharge rate.

Consumers, when faced with an increase in price for a particular product may then choose to change their consumption mix, both within meat and between meat and other products.

Responses depend on accounting

The formula set out above indicates that the relative consumption price change depends very much on the average emissions intensity for the product group. This

raises significant questions about how detailed these product groups should be, and whether different production techniques (which have different greenhouse implications) can be recognised in different product categories[3].

Consider the hypothetical case of a producer that uses vaccination to reduce enteric fermentation (or feed management, or waste management from at the processor level). In principle, beef produced in these ways has a lower emissions intensity than average. Recognising this under the consumption approach requires different product classifications with different emissions intensities, otherwise the price signal is not transmitted to the consumer. Indeed, maintaining the price signal to the final consumer requires a meat production and marketing chain that maintains separate identification.

Of course, the same accounting issue also arises under an ETS. In this case, however, on-farm audits would be necessary to maintain integrity.

Incorporating offsets

The consumption approach raises interesting questions about how offsets (tree planting and so on) might be recognised. One option would be to include offsets in the emission factor for a particular product. This is likely to lead to an explosion of product categories, however, as the carbon uptake with forestry depends on tree species, climate, management systems and so on.

Another option is to provide a direct subsidy to offset activities (at the same carbon price used in the consumption calculation) and then to leave it to the individual enterprise to effectively cross subsidise their product price to reflect the lower carbon content.

As offsets involve a risk (plantations may burn down, releasing carbon) this approach would also need to include a potential carbon tax on the offset activity.

The consumption approach does not appear to contain an 'automatic' hedge against some of these risks (in terms of the permit price) so risk management would need to be undertaken through more conventional means such as insurance markets.

Economywide or industry specific?

Most of the discussion behind a consumption approach assumes that it would be economywide – that it would apply to the whole economy in place of the CPRS.

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[3] There is a very general classification issue here. Greenhouse gas emissions are frequuently process related — they depend on particular production techniques used — and these processes do not necessarily map directly to commodity or product groups. New product classifications may need to be found to fully implement a consumption approach.

At this stage, it seems unlikely that an economywide consumption approach will emerge, at least in the short term. There is no specific legislation before the parliament, and the Government remains keen to pass the legislation for the CPRS.

It is possible, however, that a partial consumption approach could be adopted, applied specifically to agriculture, or a subset of agriculture.

A partial approach would have a number of consequences and limitations.

Full rebating of carbon costs not possible

The full rebating of carbon costs in the production chain would not be possible with a partial consumption approach as there is no mechanism to track indirect costs. These will be embedded throughout the economy as a consequence of the broad application of the CPRS.

Partial elimination of EITE problem

Such an approach would partially eliminate the EITE problem for the red meat industry in that no direct carbon cost would be imposed on exports, but it would be imposed on imports and on domestic consumption.

Reduced burden, but question of burden sharing

The burden on the red meat industry would be reduced, as the coverage is reduced. Indeed, the consumption approach is lower cost to the industry partly because it requires less abatement.

The question of burden sharing becomes significant.

In an ETS, equal burden sharing is at least partly addressed by ensuring that all activities face the same marginal cost of abatement (that is, the same permit price on all units, or all additional units, of production). With a partial consumption approach, this would not be the case, and it becomes very difficult to define what would constitute equal burden sharing. At the least, the consumption tax would need to be set at a level to raise the same revenue as would coverage under the CPRS.

Some reduced consumption will be offset by export increases

It is likely that a partial consumption approach would involve a sort of 'reverse leakage', with reduced domestic consumption being offset by increases in exports. Preliminary estimates from the GMI model suggest an offset of a little over 70 per cent (70 per cent of reduced consumption being offset by increased exports).

For red meat, this is a consequence of the very low consumption share of total production, and relates very closely to the burden sharing issue raised above.

Response of competitors

Ironically, Australia's competitors may perceive increases in Australia's exports as an artificial increase in Australia's competitiveness (something like a consumer tax being used to fund an export subsidy) and may respond accordingly.

Setting the carbon price

In the case of economywide coverage, the carbon price would be set at any rate that was considered to be appropriate (based, for example, on international obligations, expected responses etc). It is likely that this price would need to change (increase) over time.

With a consumption approach in conjunction with a CPRS, price setting becomes more problematic. Ideally, the carbon price should be the permit price emerging in the permit market. If not, there will be a serious distortion as different products would face different carbon prices. In practice this will be challenging as the permit price can be expected to change on a regular (if not daily) basis.

4 *Gains and losses: partial consumption approach versus ETS*

Table 4.1 summarises the issues raised in the previous two chapters. It compares three potential policies: coverage under CPRS; coverage under CPRS with strong EITE treatment; and a partial consumption tax approach (applying only to agriculture). It considers each of these by examining the concerns facing the red meat industry as well as the objectives of government.

The general qualitative impression from this analysis is that a partial consumption approach while dealing with some of the competitiveness issues facing the meat industry, does not deal with fundamental issues of the cost of abatement and creates additional complexities in other areas, including offsets.

4.1 Some trade offs in meat coverage under abatement policies

Issues to be addressed	*Coverage under standard CPRS*	*Coverage under CPRS with 'strong EITE'*	*Partial consumption approach (applied to meat products*
Meat industry issues			
Production cost increases	Costs cascade through economy. Direct costs substantial.	Some of these can be offset through issue of free permits. In principle, permits can be allocated to effectively exempt exports in the transition (note economywide issues below)	Indirect costs remain. Direct costs passed on to consumers Exports exempt from direct costs Imports of meat products also covered
EITE issue	Substantive	Can be reduced, but not solved for the meat industry without passing additional costs elsewhere in the economy	Partially solved (direct costs only). May lead to an increase in exports.
Limited abatement options	Substantive issue requiring careful transitional consideration and R&D policies combined with carbon pricing policies	Remains substantive, but burden to specific EITE industry (meat) reduced at the expense of other Australian industries	Remains substantive, but burden reduced as the overall requirement for abatement is reduced
Offsets — incorporation and risk management	Can readily be incorporated. Permit trading provides some risk management	Can readily be incorporated. Permit trading provides some risk management	Incorporation will be complex, most likely requiring a separate system of subsidies and taxes. No 'automatic' mechanism for risk management
Offsets — accounting	Substantive accounting issues	Substantive accounting issues	Substantive accounting issues
Economywide or government issues			
Burden sharing	In principle, coverage implies equal burden	Same issues as with the CPRS before the Parliament. EITE assistances ultimately results in a higher burden elsewhere in the economy (for a given emissions target).	Prima facie lower burden on meat producers and the base of abatement is lower. High burden on domestic consumers.
Efficiency	Maximum efficiency in principle (broadest possible coverage). Harder to be sure in practice because of transactions cost issues	Efficiency compromised by free allocations to selected industries.	Complex picture. Meat likely to face lower marginal cost of abatement which in principle will lower efficiency
Alignment with international obligations	Generally straightforward to align	Generally straightforward to align	More complex, as quantity outcomes are less predictable

5 Policy tradeoffs: illustrative simulations

This chapter brings together the discussion from the previous sections by drawing on some illustrative simulation results. Full details of the simulations are provided in the appendix.

Illustrative simulations

The key feature of the simulations is that they provide a comparison of the effects of meat coverage under the CPRS (that is, production based emission trading with either no free permits, or with 90 per cent free permits) with a consumption approach that imposes a consumption tax on domestic consumers in order to generate the same revenue that would have emerged under the CPRS, and in order to be able to fund the same level of red meat abatement as under the CPRS.

In terms of overall changes in the quantity and gross value of production, a consumption approach has a significantly smaller impact that does either and ETS with no free permits, or an ETS with 90 per cent free permits (see charts A.5 and A.6). Not surprisingly, the reduction in emissions is also considerably lower under the consumption tax than under the ETS (chart A.7). The simulations assume, however, that the consumption tax is adjusted to as to fund the same number of permit purchases (on the international market) as would have been required under the ETS.

This result comes about because of a significant reduction in domestic consumption brought about by a large consumption tax. The simulations indicate that by 2030, the consumption tax required would be 43 per cent for beef, 26 per cent for sheep meat, 12 per cent for pork, and 5 per cent for poultry (assuming that the ETS had no free permits) or a tax of 18, 11, 5 and 2 per cent for these meats assuming that the ETS would have provided 90 per cent free permits.

These high tax rates have a significant effect on consumption, with the decline in beef consumption, for example, of between 12 and 25 percent (relative to BAU) by 2030.

Implications

These results illustrate several important points:

- A consumption approach results in a reduction in domestic consumption, but a smaller reduction in production as product is transferred from the domestic market to the export market. Export prices are reduced.
- Domestic emissions barely fall under the consumption approach (rather, burden sharing is assumed through the purchase of international permits). This means that there is very little incentive to find low emissions means of production or to engage in significant offset activity.
- The overall result depends on the response of consumers to consumption taxes. The simulated taxes would be expected to induce a large structural change in meat consumption. Indeed, the relative price change is quite large compared with what has happened in the historical record. This means it is very difficult to accurately predict that the responses of consumers would be.
- If a consumption approach is intended as a transitional measure while the industry develops technologies to reduce emissions, then it will be important to consider the long term implications of discouraging domestic consumption of meat. Such an approach goes directly against many years of domestic marketing campaigns.

A Simulated effects of a consumption based emission policy on the Australian meat industry

This Appendix presents illustrative simulations comparing the effects of a *production* approach to emissions mitigation with a *consumption* approach to mitigation.

Under a production approach — which would come about, for example, through the inclusion of agriculture under the proposed Carbon Pollution Reduction Scheme (CPRS) — producers are required to abate emissions from the full production base. This means that exports are effectively taxed under the policy.

With a consumption approach, only domestic consumers are taxed, and exports to not face a carbon price burden. Because of the high export share of meat consumption, the consumption approach involves considerably less burden on the meat industry. In order to allow for a fair comparison, however, we calibrate the simulations to effectively allow for the same amount of abatement.

The simulations

The results presented below involve comparing the effects of the CPRS (as previously estimated for MLA in CIE 2009b) with the effects of a meat consumption tax which is calibrated in order to:

- generate meat consumption tax revenue equivalent to the proceedings of permit sales (to the meat industry) under the CPRS; and
- generate sufficient additional government revenue to allow the purchase of permits (on the international market, for example) to effectively create the same abatement as under the CPRS.

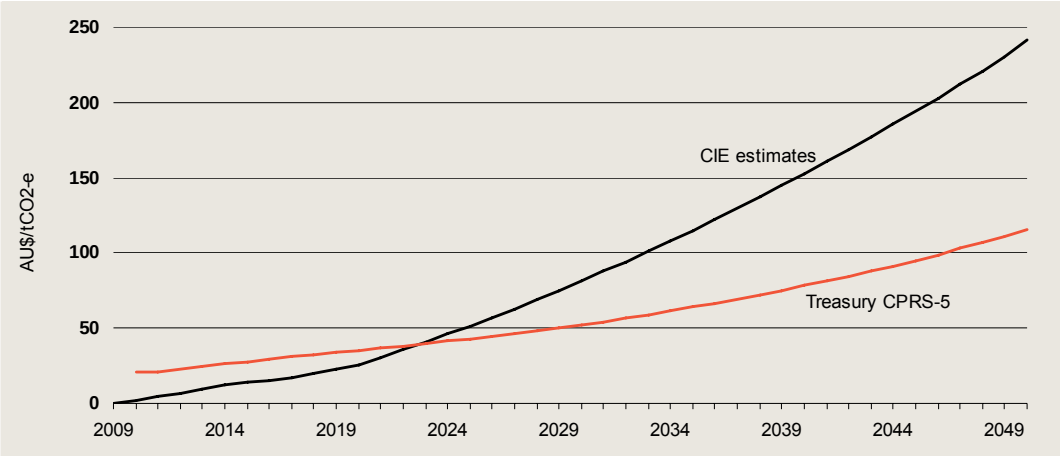
Other assumptions

We use the same other assumptions as we did for MLA in the analysis of the impact of CPRS on red meat processing (CIE 2009b).

In particular, we use the emissions permit price series generated by the CIE Oz-Cubed model for the CPRS scenario which includes agriculture after 2015. It is projected that the price would start from A\$2.3/tCO_2-e in 2010, the first year of the

CPRS, to \$14.5/tCO_2-e in 2015, to \$25.7/tCO_2-e in 2020 and \$81.3/tCO_2-e in 2030 (black line in chart A.1).

A.1 **Emissions permit price**



Data source: CIE Oz-Cubed simulations, Commonwealth of Australia (2008, Chart 6.3, page 140)

The permit price was generated for a domestic emissions reduction target similar to that of the Treasury CPRS-5 scenario: 5 per cent below 2000 levels by 2020 and 60 per cent below 2000 levels by 2050 (Commonwealth 2008). We include the Treasury CPRS-5 price series in chart A.1 for comparison. It is clear that our projection of permit prices is lower than Treasury in the early years of CPRS, and higher in the later years.

For the changes in input prices and changes in demand due to lower household disposable income, we use the results of 'Participant' scenario as set out in our previous report (CIE 2009, charts 2.3-2.8, pages 22-25).

Scenarios

Two scenarios for including agriculture in the CPRS are considered in the simulations:

- *Full coverage*: agriculture is included in the CPRS or similar emissions policy from 2015 and there is no free allocation of permits to agriculture; and
- *90 per cent free*: agriculture is included in the CPRS from 2015 and is allocated free permits equivalent to 90 per cent of its emissions in 2015 and the level of free permits available to decline by 1.3 per cent each year.

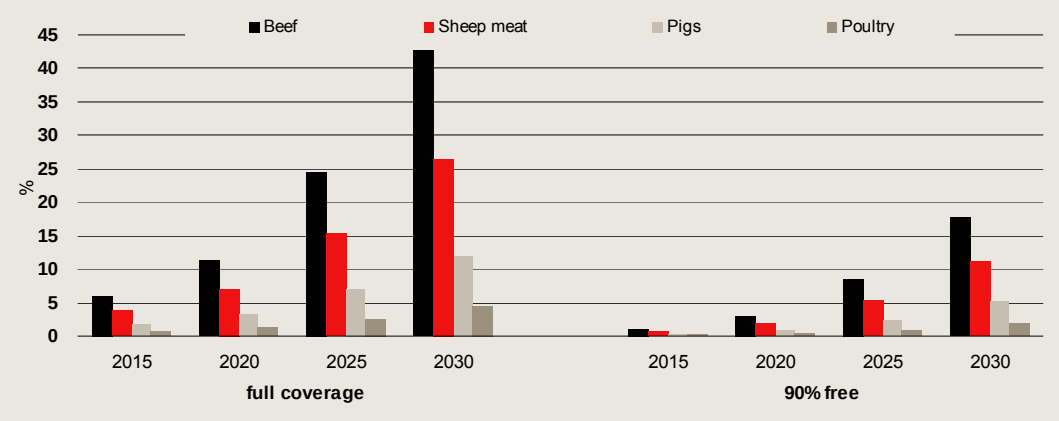
This second scenario is designed to capture the fact that if meat were to be included in the CPRS, it is very likely that it would receive the same permit allocation as is currently proposed for emissions intensive trade exposed (EITE) industries.

Required consumption tax rate

Chart A.2 shows the required consumption tax rates imposed on beef, sheep meat, pork and poultry meats to raise the revenues as set out above for the *full coverage* and *90 per cent free* scenarios. The relative consumption tax rates are determined by the relative product emissions intensities. Beef has the highest consumption tax rate because it has the highest per unit emissions intensity.

It is estimated that the consumption tax rate for beef, sheep meat, pork and poultry meat in 2030 will be 43, 26, 12 and 5 per cent, respectively, for the *full coverage* scenario. On the other hand, the tax rate would be smaller for the *90 per cent free* scenario — 18, 11, 5 and 2 per cent, respectively, for beef, sheep meat, pork and poultry meat in 2030.

A.2 **Required consumption tax rate**

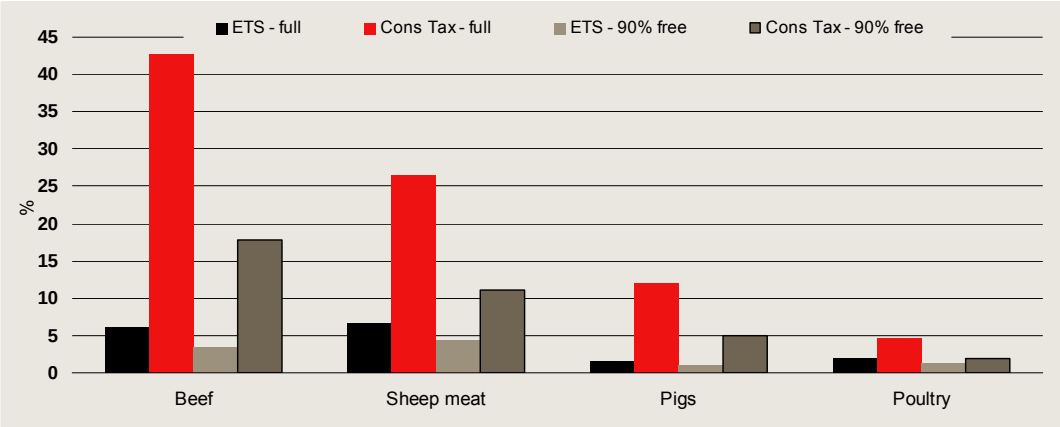


Data source: CIE GMI simulations

Because the tax base is much smaller for a consumption approach than for a production approach, the required consumption tax rate is significantly higher than the equivalent retail price changes under a production approach.

Chart A.3 compares the required consumption tax rate under a consumption approach with the changes in retail price under the production approach in 2030. It is evident that the former is higher than the latter for any scenario and any meat product. For example, beef retail price would rise by only 6 per cent for the full coverage scenario and by 3 per cent for the 90 per cent free scenario.

A.3 **Changes in retail price versus consumption tax rate in 2030**

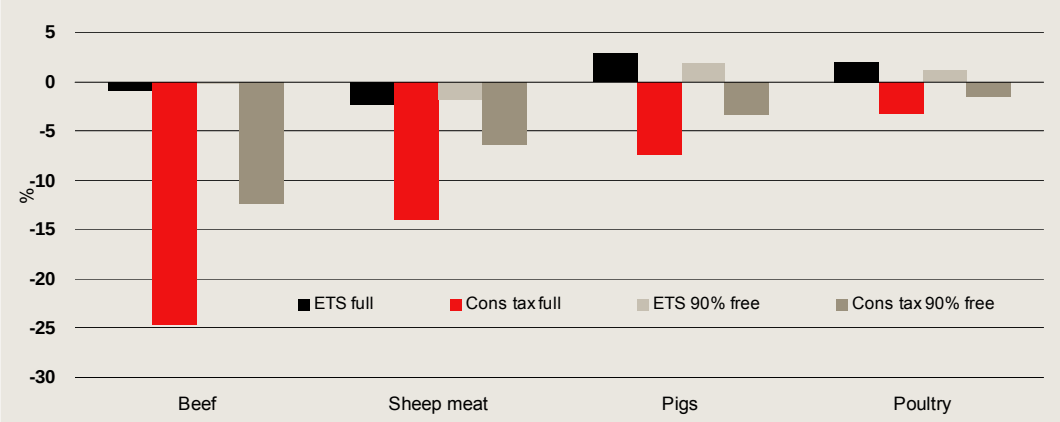


Data source: CIE GMI simulations

Impact on consumption

Chart A.4 compares the impact on meat consumption of the consumption taxes with the outcomes for the CPRS.

A.4 **Changes in meat consumption in 2030**



Data source: CIE GMI simulations

With the high consumption tax rates, domestic beef consumption in 2030 is projected to fall by 25 per cent (relative to BAU) for the *full coverage* scenario and by 12 per cent for the *90 per cent free* scenario, significantly higher than the reduction of 0.9 and 0.2 per cent for the two scenarios under the CPRS. Similarly, domestic sheep meat consumption in 2030 is projected fall by 14 per cent (relative to BAU) for the *full coverage* scenario and by 6.5 per cent for the *90 per cent free* scenario under the consumption approach, compared with a 2 per cent reduction under the CPRS.

A consumption tax would depress domestic consumption of pork and poultry meats as well, while their domestic consumption would rise under the CPRS. In 2030, consumption of pork and poultry meats would fall by 7.5 per cent and 3.2 per cent,

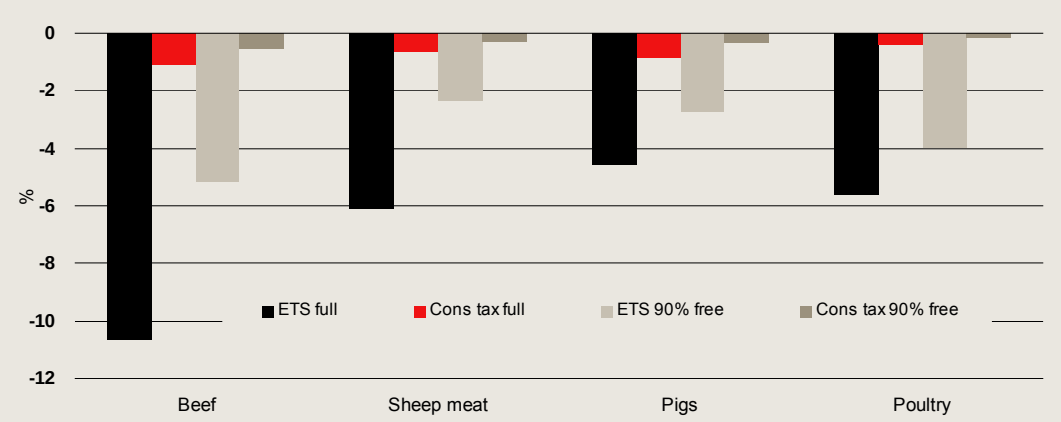
respectively, for full coverage scenario, while under the CPRS it would increase by 3 per cent and 2 per cent, respectively.

Impact on production

Although a consumption tax causes bigger changes in domestic consumption than a production based policy, it has less impact on total production, especially beef and sheep meat, because most of products are exported which are not affected by a consumption tax.

Chart A.5 compares the changes in production under a consumption based policy with those under a production based policy in 2030. For the *full coverage* scenario, beef and sheep meat production in 2030 would fall by 10.7 and 6.1 per cent (relative to BAU), respectively, under the CPRS, would fall by only 0.5 per cent for beef and virtually no change for sheep meat under a consumption based policy. Pork and poultry meat production would increase slightly (by 0.7 and 1.3 per cent, respectively, under a consumption tax), compared with fall of 4.6 and 5.6 per cent, respectively, under the CPRS.

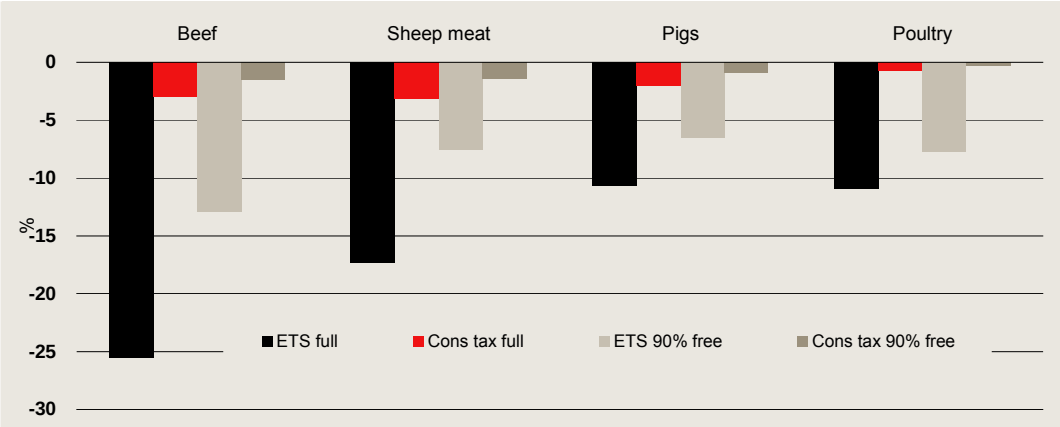
A.5 **Changes in meat production in 2030**



Data source: CIE GMI simulations

Chart A.6 compares the change in gross value of product (GVP) in 2030 under production and consumption-based approaches (note that this is net of permit costs in the case of the CPRS). With a consumption tax, domestic consumers will bear most of the costs of the emissions policy and it has minor impact on producers (as they are able to transfer product to the export market). For example, for the *full coverage* scenario, beef, sheep meat, pigs and poultry NGVP in 2030 would fall by more than 25 per cent, 17 per cent, 11 per cent and 11 per cent, respectively, under a production based policy while they would fall by only 3 per cent, 3 per cent, 2 per cent and less than 1 per cent, respectively, under a consumption based policy.

A.6 **Changes in gross value of product in 2030**



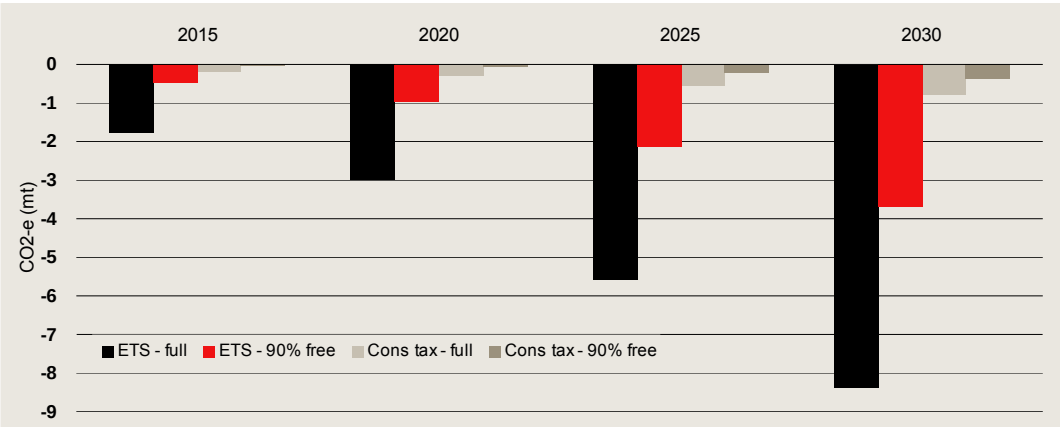
[a] Net gross value of product is the gross value of product (farm gate price times production) net of emissions charges

Data source: CIE GMI simulations

Impact on emissions

Chart A.7 compares the impact of the policies on greenhouse gas emissions from meat production. Because there is little change in meat production under a consumption based policy, the emissions reduction is insignificant. For example, emissions in 2030 under the CPRS would reduce by 8.4 and 3.7 $mtCO_2$-e, respectively, for the *full coverage* and *90 per cent free* scenarios, compared to reduction of only 0.8 and 0.4 $mtCO_2$-e under a consumption tax approach.

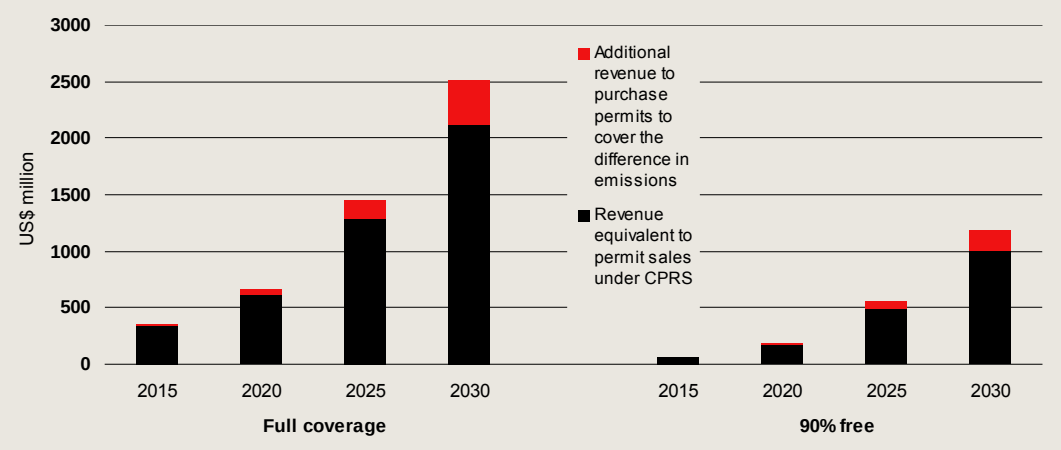
A.7 **Impact on emissions**



Data source: CIE GMI simulations

As a result by 2030, the government has to raise another US$383 million and US$183 million, respectively for the *full coverage* and *90 per cent free* scenarios, in order to purchase permits to cover the difference in emissions reduction. Plus the required revenue to be equivalent to the permit sales under CPRS, total revenue the Government has to raise from meat consumption would be US$2.5 billion for the full coverage scenario and US$1.2 billion for the 90 per cent free scenario (chart A.8).

A.8 **Consumption tax revenue**

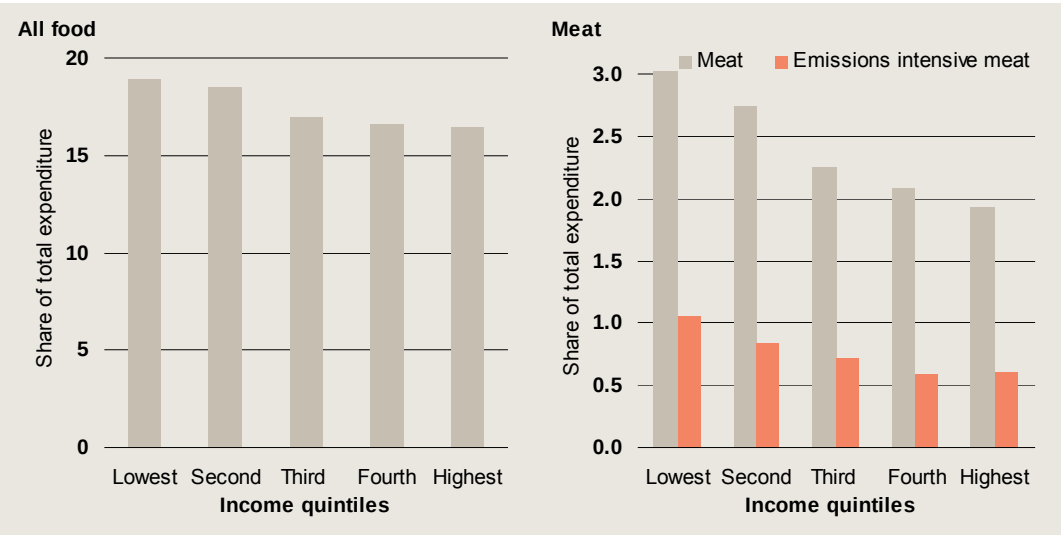


Data source: CIE GMI simulations

Regressive nature of a consumption tax

Chart A.9 shows the relative consumption shares for food, meat and emissions intensive meat, for the five income quintiles in the Australian population.

A.9 **Shares of food and meat consumption for income groups**



Data source: ABS *Household Expenditure Survey*.

The relativities between low and high income increase as the focus is more on emissions intensive products. For example, the lowest income quintile spends around 19 per cent of income on food, which is around 1.15 times the proportion for the highest income group. For meat, the lowest income share is 1.6 times the highest, while for emissions intensive meat, the lowest income share is 1.7 time the highest income share.

Lower income households will clearly experience a greater proportionate increase in costs as a consequence of any taxes on consumption.

Comments and qualifications

The domestic tax changes calculated here is significant and of an order of magnitude not previously seen in Australia. This creates some uncertainty about what consumer responses are likely to be. Here we have assumed that the tax leads to a reallocation of consumption within the meat bundle, but that it also reduces aggregate meat demand. We have assumed an aggregate meat demand elasticity of -1.

If a consumption approach is intended to be a transitional mechanism while the industry finds ways of abating emissions, then it is worth thinking carefully about the potential long term impacts on the domestic market of large tax increases.

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