To: Senate Select Committee on New Taxes
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Submission to the Inquiry into Carbon Tax Pricing Mechanisms

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Only a consumption basis tax can overcome the fatal barriers to carbon pricing legislation and achieve policy objectives.

This submission focuses on the objectives of carbon pricing, and critically examines the efficacy of alternatives in achieving those objectives. It concludes that a consumption-basis tax is the only system that has potential to deliver emissions reductions at an acceptable level of impost on the Australian economy and in a manner consistent with mitigation of global climate change risks.

Summary

Carbon pricing acts as a tool affecting behavioural change of consumers, and investment decisions of producers.

Production basis (taxing domestic production and exports but not imports) is far less effective and equitable than consumption basis (taxing domestic production and imports but not exports). Some comparisons of the two approaches are given in the following table.

Production basis carbon price	**Consumption basis carbon price**
Producer pays (largely developing countries)	User pays (largely developed countries)
Exports less competitive	Trade-neutral
Advantages imports over domestic products (perverse)	Trade-neutral, and transport emissions included
Emissions and jobs leakage	Little if any leakage
Sector targeting	Economy wide
Price dependent on global price	Unilateral price setting

The price signal is maximized

- when the price is conveyed directly to consumers, whose decisions determine demand for emissions,
- when it is visible and unavoidable, having equal value throughout the economy,
- when its future value is predictable maximizing investment and strategic change in consumption modes, and
- when consumption is discretionary or where viable alternatives exist.

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These conditions can't be met under a production-based tax as the carbon price applies differently to different items in the economy. Such a tax would maximize behavioural change to evade the tax rather than to avoid emissions.

Leakage of emissions and jobs, by shifting demand from domestically produced items to imports and by reducing international competitiveness of exports, would ensure a production-based tax or trading system has minimal impact on emissions for maximum impact on the Australian economy.

Some comparisons between carbon trading and a direct tax are given in the following table.

Cap-and-Trade	**Tax**
Price is unpredictable and differs for emissions from different activities (discourages investment in low-emissions technology).	Price is predictable and equitable.
Trader profit-taking distorts market	No middle-men
International trade = offsetts, not additionality.	International funding from tax revenue is additional.
International price imposes domestic price, resulting in a weak price signal unable to shift domestic emissions demand significantly.	Price can be set independent of other countries, just as for the GST, allowing responsiveness to Australian emissions demand elasticity
Cap = Floor: all permits issued will be used. (voluntary action doesn't help)	All action is rewarded, at any point in production or consumption.

The submission explains the fallacies in erroneous claims for carbon trading. It does not directly control the quantity of emissions, any more than a carbon tax. It does not utilize the allocative efficiency of free markets to distribute emissions to their most productive use, and it does not deliver emissions reductions at the lowest price.

It is concluded that a consumption-basis tax, functioning in a similar manner to the GST, would deliver the greatest emissions reductions at the lowest price, and maximize government revenue available for easing the transition to a low emissions economy via household compensation and direct enhancement of low-emissions alternatives to business-as-usual. A consumption-basis tax would also facilitate international participation and cooperation in achieving global emissions reductions.

Objectives of Carbon Pricing

The explicit objective of pricing greenhouse gas emissions ('carbon') is to achieve reductions in emissions, and thereby to mitigate climate change.

It should be clearly understood that a carbon price is a tool for achieving *behavioural change*. Thus, the primary objective is behavioural change. Pricing is what is referred to as a market *signal*, influencing the purchasing behaviour of consumers, and in turn the investment and process behaviour of suppliers. The efficacy of a price signal depends on the elasticity of demand for emissions-generating activities, which in turn depends on the availability, adequacy and visibility of alternatives (including non-consumption, as well as lower-emitting

means of gaining equivalent utility). It might also depend on the consumer's perception of likely future price shifts, and their perceived level of control over this component of cost relative to others. Thus a carbon price is an intervention in a complex system of collective decision-making, whose effects are not direct but are somewhat predictable.

It is widely claimed that carbon pricing alone is insufficient, but this diminishes its role in providing a context in which all other measures are more economically favorable. It therefore plays a synergistic role across all forms of climate change response.

Additional objectives may be considered, including:

- to build trust and enhance cooperation among nations toward global action.
- to enhance the status of the Government among voters concerned about climate change.
- to facilitate earlier, and therefore more orderly, restructuring of the Australian economy toward less reliance on fossil fuels, before this is forced on us by Peak Oil and international climate change measures.

Other criteria for an acceptable carbon pricing mechanism may include:

- minimal disruption of the Australian economy
- minimal displacement of jobs
- minimal change in value of existing assets
- minimal impact on households, particularly low income households.
- minimal burden of compliance

The Demand-Price Response Function

It is useful to have in mind a graphical depiction of a demand-price response, such as those below.

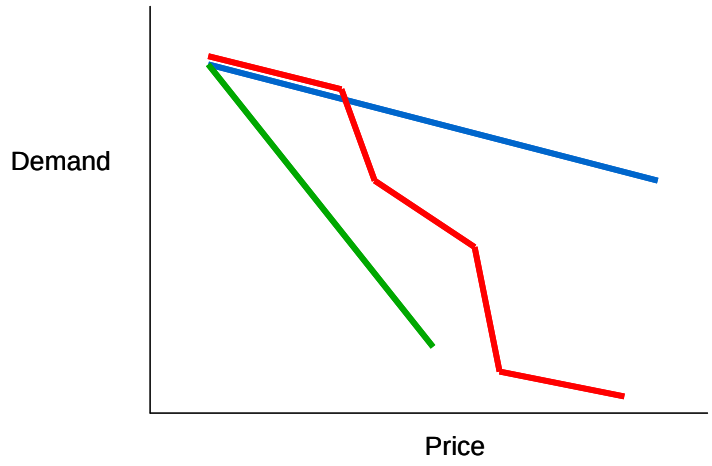

Figure 1. A diagrammatic representation of demand-price relationships.

The steepness of the line is referred to as the elasticity of demand. Thus, in the above diagram, the green line depicts a product with greater demand elasticity than the blue line: for the same change in price, the change in demand is greater. Apart from adjusting price, measures can be taken to increase demand elasticity, by making lower-emissions options more available, more comparable to existing options in terms of user benefit, or more visible.

It is also important to realize that the function is not likely to be steady over its whole range, but may more closely resemble the red line above. Significant shifts in demand may occur when the price reaches a point at which a particular alternative becomes economically viable. Reducing the cost of low-emissions technologies (such as by increasing scale or market access or risk management) moves the step to the left, so that major reductions in demand can be achieved at a lower price.

Other psychological factors also affect behavioural response to a price signal. If the contribution of a carbon tax to the final price is visible to the consumers, they are more likely to compare products on the basis of embodied emissions and put pressure on producers to reduce emissions. They are also more likely to make well-informed decisions about which changes most reduce their emissions, rather than appeasing their conscience with often trivial gestures (like turning off mobile phone chargers). Visibility of the carbon price is therefore likely to increase demand elasticity.

Production-basis versus Consumption-basis Pricing.

The current proposal is to tax emissions produced in Australia, regardless of where the produced items are to be consumed. It therefore penalizes our exports, as they compete internationally with similar products which don't incur a carbon tax. It also penalizes those products sold on the domestic market in competition with imports. These 'trade-exposed' industries rightly want compensation or exemption.

The problem is that compensation or exemption prevents the price signal from reaching the consumers, and therefore minimizes behavioural change. The more industries that are 'carved out' of the system by compensation or exemption, the greater burden placed on remaining sectors to achieve the emissions reductions required. There is also greater potential for perverse behavioural change, not reducing emissions but shifting consumption from included activities to excluded activities (either carved-out or imports). In an open economy such as Australia's, a large proportion of activities are trade-exposed to some extent. Arbitrary boundaries on compensation create a sense of antagonism among those who miss out.

Various studies have demonstrated that a carbon price of 20 to 35 dollars per tonne will not threaten the viability of most Australian industries. The Grattan Institute's report "Restructuring the Australian Economy to Emit Less Carbon"[2] found that, at $35 per tonne, only the steel and cement industries warranted support to prevent leakage of jobs and emissions overseas, while aluminium and oil refining should be allowed to shift to lower-emitting overseas supply with assistance only applied to the displaced workers in these industries. The adjustments, they claimed, would be small in comparison with the tariff reductions, privatizations and competition reforms of the 1990s.

Two questions arise from these analyses: is the price modeled a sufficient price to achieve the needed reductions, and does it make sense to treat industry sectors differently based on their individual circumstances?

[2] Daley J. and Edis T. 2010. Restructuring the Australian Economy to Emit Less Carbon. Grattan Institute Report No. 2010-2, April 2010.

I would argue that it is highly desirable to have a system in which the price range is not constrained by thresholds for industry viability, and that uniform treatment of all industries best preserves the integrity of the price signal experienced by consumers. A consumption-basis carbon price can deliver these outcomes.

International equity and cooperation

Internationally, there is an imbalance between production and consumption. Some countries, like China and Brazil, export products with far more embodied emissions than those they import. Others, like those in Western Europe and North America, consume more embodied emissions in imports than they export. When emissions are attributed on a production basis, the Chinese are held accountable for emissions which occur in China on behalf of consumers elsewhere. Europeans have been able to show restraint in their emissions, largely by shifting from domestically produced to imported consumer items while their global footprint has in fact expanded.[3,4]

This arrangement is inequitable. The principle of user pays dictates that it is the final consumer who should be accountable for emissions involved in delivering products and services to them. Furthermore, it is inefficient to impose a price penalty to producers, as it is the behavioural change of consumers which ultimately controls emissions change.

Most net exporters of emissions are developing countries, while most net importers are developed. *A production basis therefore shifts the burden of emissions reduction inequitably from richer to poorer countries.* There is a strong disincentive for developing countries against taking action which would harm their terms of trade. This arrangement therefore constitutes a barrier to international action.

A production-based system discourages other countries from following suit, by penalizing industry in countries first adopting a carbon price, and rewarding laggards who receive the jobs and industry growth by not applying a carbon price.

Advantages of consumption basis

A consumption-basis system is inherently equitable, as it is user-pays. It is also trade-neutral, as it taxes imports on the same basis as domestically produced equivalents and exempts exports (which may be taxed by the importing country if that country has a carbon price). Therefore it does not discourage uptake by other countries, and does not reward laggards. Since the competitiveness of trade-exposed sectors is unaffected, no industry compensation is required, leaving more revenue for household compensation, supporting low-emissions initiatives and climate change adaptation.

Consumption basis also allows international transport emissions to be covered. These emissions are a problem in the Kyoto system as they are not attributable to any country on a

[3] Wiedmann, T., Wood, R., Lenzen, M., Minx, J., Guan, D. and Barrett, J. (2008) Development of an Embedded Carbon Emissions Indicator – Producing a Time Series of Input-Output Tables and Embedded Carbon Dioxide Emissions for the UK by Using a MRIO Data Optimisation System, Report to the UK Department for Environment, Food and Rural Affairs by Stockholm Environment Institute at the University of York and Centre for Integrated Sustainability Analysis at the University of Sydney, June 2008. Defra, London, UK.

[4] Clark D. 2011. Carbon cuts by developed countries cancelled out by imported goods. Guardian UK Monday 25 April 2011. http://www.guardian.co.uk/environment/2011/apr/25/carbon-cuts-developed-countries-cancelled

production basis. By including transport emissions in the tax applied to imports, the cost is transferred to the consumers on whose behalf they are emitted. If an international bunker fuel tariff is finally put in place, the value of this tariff could be deducted from the tax on transport emissions, to avoid double jeopardy while maintaining the coverage of the Australian carbon price.

Australia is one of very few developed countries that are net exporters of emissions, due to our coal and steel exports. *It would advantage Australia for international responsibility to be on the basis of emissions consumption rather than production.* The adoption of a consumption-basis carbon price would encourage the uptake of such a system internationally. But it would still be compatible with production-basis targets under the Kyoto Protocol: there is no impediment to meeting a production-based target using a consumption-based mechanism.

Carbon Trading versus Carbon Tax

While the current proposal is for a carbon tax, a political commitment has been made to transition to a carbon trading mechanism.

Such a move would greatly devalue the carbon price signal, in terms of its ability to meet the stated objectives.

Carbon trading is generally promoted on the basis that it

- directly controls the quantity of emissions, when a tax only controls the price;
- utilises the allocative efficiency of free markets to ensure emissions are rationed to those who can obtain most economic benefit per tonne;
- can deliver emission reductions at the lowest price.

All of these claims are false.

Quantity versus Price Controls

Emissions trading controls the quantity of permits, but not the quantity of emissions. Because of the high transaction and monitoring costs in emissions trading, the scheme would only apply to large emitters. If applied on a production basis with trade-exposed industry carve-outs, the coverage would be further limited to non-trade-exposed large emitters. Already evident from the NGERS[5] reporting requirement and the lead-up to the proposed CPRS is that many larger entities were prepared to separate emissions-intensive activities into smaller business units which don't qualify for obligations under the carbon trading scheme.

Thus perverse behavioural change can be triggered, with custom moving from larger providers who must account for their emissions to smaller ones who do not, or businesses restructuring to avoid compliance.

A cap-auction-trade system requires that participating parties can foresee their emissions requirements for a whole year in advance. This is an unreasonable and inflexible encumbrance. The outcome would be increasing volatility of price toward the end of an issuing period, and possible prevention or deferral of economic activity causing potential

[5] National Greenhouse Emissions Reporting Scheme.

hardship, due to a carbon price higher than that experienced by other businesses or at other times.

The Allocative Efficiency of Free Markets

Advocates of cap-auction-trade systems fail to recognize that *a straight tax is a market-based intervention*. Either system moves consumers along the demand-price response curve, and to this extent they equally utilize the allocative efficiency of the market. It is arguable that a tax allocates with greater integrity, as the price is constant for all users and all activities. Hence behavioural change would be more consistently based on emissions avoidance, rather than on carbon price avoidance.

As discussed above, cap-auction-trade advocates also emphasise the absolute nature of the cap, to limit total emissions. However, were the cap to be actually applied, preventing any further 'consumption' of emissions in a given time period regardless of the demand-price function, this would imply that the allocative efficiency had failed. So the first of the claims for cap-and-trade belies the second. *Allocative efficiency implies that the demand-price function is operating. While it is operating, both systems are equally controlling quantity via price, not the other way around.*

A conceptual pitfall lies in regarding the purchaser of emissions permits as the consumer. In fact, the permits are purchased by producers, but decisions about consumption are made by consumers. The lack of clarity in transferring the price signal through to the behavioural decision makers is a major failing in the cap-and-trade system.

Total emissions depend on consumer demand at the prevailing price. There is no reason to believe that producer demand for emissions accurately reflects consumer demand, so the price achieved by auctioning permits under cap-and-trade may not translate into the consumer price needed to get demand to equal the number of permits issued. In fact it is not clear how the price signal will be transferred to consumers, when businesses are trying to avoid behavioural change that would reduce their sales. An imbalance between consumer demand and permits issued may result in a range of unintended impacts, which do not constitute allocative efficiency.

Lowest Price Emissions Reductions

A distinction needs to be made between lowest price emissions, and lowest price emissions reductions.

The lowest price emission reductions are achieved when the price signal is structured to maximize emissions-avoiding behavioural change across the whole economy. That is, the demand-price relationship is made as elastic as possible. This occurs when a consistent and visible price is applied as widely as possible to all activities. This is not facilitated by carbon trading.

The lowest cost emissions may be obtained through an international emissions trading scheme. Such a scheme induces maximum behavioural change in the form of seeking out the best deals, speculating on price movements, using derivatives to avoid scrutiny of the actual reductions achieved by off-set activities, and other perverse activities. The expectation that

emission costs may be minimized in this way acts as a deterrent to behavioural change that actually reduces emissions.

The predictability of future price is also a major determinant of investment in innovation. The price volatility under cap-and-trade discourages investment, which would have increased demand elasticity by expanding alternatives to high-emissions behaviour. Continued low elasiticity is an opportunity cost, increasing the price at which the emissions target can be achieved.

To the extent that the price at which Government sells emissions permits constitutes a tax (albeit at a demand-responsive rate of taxation), the *capacity to trade permits among private entities or internationally constitutes nothing more than a tax evasion scheme*. As with all tax evasion schemes, the largest players benefit most, and a great deal of rent-seeking is possible in the brokerage. All such private benefits are at public cost, diminishing the revenue available to compensate consumers or to invest in low-emissions alternatives. This directly increases the societal price of emissions reductions.

Cap as Floor

Another major draw-back of cap-and-trade systems is that the cap also acts as a floor. It is not possible to draw down emissions any faster than the schedule set by Government to limit permit volumes. All voluntary efforts to reduce personal emissions consumption only act to reduce the price for emitters. Allowing people with solar panels to retire their renewable energy certificates instead of selling them into the permits market only slightly reduces the problem, as it doesn't do what really matters, which is to reward people who simply consume less. A cap-and-trade system has the potential to slow emissions reduction, by discouraging voluntary action.

How would a consumption-basis tax work?

People tend to be deterred from considering a consumption-basis tax, because they assume it has high information and compliance requirements, to track the embodied emissions in each product. This is not so.

At its simplest, the tax would be applied to all fossil fuels and lime/clinker as it enters the Australian market – either at the producer or importer. Rebates for exports and taxes on imports would depend on inventories of embodied emissions for classes of product. This would be less accurate than a system which tracks embodied emissions, but such inventories have been developed by research groups assessing emissions consumption and so are readily available from objective sources. If the tariffs imposed can be shown not to penalize imports over domestic products, it would be WTO-compliant.

Consequently, a consumption-basis tax would monitor fewer entities as primary sources of emissions than the NGERS system. Fossil fuel and lime can be assumed to be destined to produce emissions regardless of who owns them at the time they are burnt or released. So the complexity of reporting under NGERS can be dispensed with, as the tax would be levied up-stream, and would apply to all users regardless of their size. A raft of perverse behavioural change is thus avoided. Arguably, some users such as plastics manufacturers could claim a tax rebate, on the basis that they have sequestered the potential emissions from petrochemicals into products with long-term stability. This would depend on demonstrating

that the products are not ultimately destined for incineration or natural breakdown. The small value of the tax involved probably doesn't justify such complexity.

Other sources of emissions, such as refrigerants or methane-producing activities, may be included in the scheme when adequate monitoring is in place. Their initial exemption would limit the coverage of the system, but not in the arbitrary way that the CPRS cap-and-trade system proposed to limit coverage based on a threshold quantity of emissions. Under the CPRS, there would have been substantial capacity and incentive for substitution between included and excluded activities. There would be little if any substitution between activities emitting different greenhouse gases. Hence there is no need to ensure adequate systems are in place for taxing all types of greenhouse gases before introducing the tax. Their omission does not corrupt the tax and they can be added in when ready.

Advantages of a fully tracked carbon tax

My preferred system would involve handling the carbon tax like the GST, so that it is wholly and visibly passed on to consumers.

Beyond primary sources (producers or importers of petrochemicals and lime), businesses would only be asked to do what they are already used to doing: keeping accounts and distributing their costs among their products. They do not need specialist expertise to track and report their direct and indirect emissions, as large businesses now need under NGERS. Once software is in place, the invoicing and reporting would be automated as it is for GST. In fact the system would be so similar to GST that it could be reported on the same business activity statements, requiring no duplication of effort.

Each business would only need to keep accounts of the units of carbon and the value of tax that they incur and charge. They would be expected to demonstrate a balance on their business activity statement, allowing for any change in inventory held and a limited amount of carry-over from one period to the next. Carbon units incurred on purchase of capital items would be claimed in the period and proportion that a tax deduction is claimed, that is for the amount depreciated or the deferred loss claimed in the reporting period.

Businesses would need to distribute all the emissions incurred to the products and services they provide. They would have flexibility about how they do this, such as a uniform amount per dollar charged, or an overheads amount on top of the emissions attributable to each item when they received it, or a separate charge for different activities based on their energy intensity. It doesn't matter, as long as the total charged to clients equals the total incurred by the business. Market forces will encourage them to attribute the emissions as accurately as practical to the items that incur them.

The beauty of this system is that each business's decisions about their own energy efficiency, energy sources, choice of suppliers, transport modes, packaging, advertising, waste reduction et cetera impact on the carbon price they must attach to their products and services. Yes, services generate emissions too. Behavioural change at all levels counts.

The value of the carbon tax may vary from time to time by decision of government or a government-appointed entity (somewhat like shifts in interest rates), and businesses will be holding inventory at the time of the price change. It is therefore important for the preservation of the embodied emissions record, that it is the units of emissions that are passed

on, not the value of the tax paid. This would be most easily managed by following the GST system, of claiming the value of all carbon tax incurred, and paying the value of all carbon tax charged, for each reporting period. After a tax increase, government would expect to receive net revenue on account of inventory turned over, while carbon units remained in balance.

At other times, only primary sources would pay net tax on average. They, like other businesses, would need to report and pass on carbon units incurred in their operations, for their own fuel, plant and equipment, electricity etc. Thus the carbon units attributed to a unit of fuel sold would be not only the emissions that the fuel would generate when burnt but also the emissions generated in delivering that product to point of sale. This is a system with far greater integrity than most carbon accounting attempts, and the power of the information it generates has enormous potential to maximize the efficiency of emission reduction efforts.

Small businesses which are not registered for GST could be treated as end-users. They would have no obligation to report carbon tax incurred or to provide tax invoices to clients. They may choose to provide the embodied emissions to clients for their information, and the cost would contribute to their pricing (since they can't claim a rebate), but they would have no reporting requirements.

Government entities would also be required to report their carbon units incurred, as they report GST. Such accounts are needed to complete the national emissions consumption inventory and to determine per capita emissions due to government services.

The idea is that the tax is always passed on to the end users, as it's their decisions, not the producers' decisions, that control demand for emissions. Not only would they have a price signal in the total price paid, but the invoice would show how much of that price is due to carbon tax. So whether they are motivated by economics or ethics, they would have the information they need to make choices.

Border adjustments

The carbon tax border adjustments would be just like the GST, and hence quite compatible with WTO rules. No compensation would be needed for the trade-exposed industries, and the burden would be more equally shared across the economy.

Exports would claim a rebate, according to the embodied emissions stated on their tax invoice. This would be more accurate than product-category estimates. This invoice would provide a statement of embodied emissions, which the recipient country can use to apply their own carbon tax. It therefore assists them in adopting a carbon price, and ensures they receive the revenue to facilitate their economic adjustment.

Imports would be taxed on estimated embodied emissions, including their transport. These estimates might be based on assuming best available technology, parity with Australian equivalents or by energy mix of source country. Such details have been worked through by researchers of emissions consumption, who are better equipped to advise on them[6]. Other countries with a carbon tax may be advantaged by being able to supply a more accurate emissions statement.

[6] For example, the Centre for Integrated Sustainability Analysis at the University of Sydney

The Australian import tariff could deduct any carbon price already incurred by either the product or its transport in any other jurisdiction. If that tax exceeds the tax due on entry to Australia, no tax would be charged but no rebate would be given. Regardless of such adjustments, the full value of the attributable carbon units would be passed to the importer as if fully paid.

For transport, a standardized formula could be applied, based on either the volume shipped or the weight transported by air of the packaged consignment.

International transport emissions are currently a problematic area under the Kyoto Protocol, because no country takes responsibility for them. A bunker fuel levy is currently being negotiated. If it is implemented, it will represent quite a low level of carbon tax, and could be readily deducted from the amount owing on imports.

While it makes most sense for transport of goods to be taxed in their country of destination, passengers should be taxed in their country of origin. A carbon tax would be applied to airline tickets on the basis of distance traveled, regardless of whether they are domestic or international flights, and regardless of any off-set scheme applied by the airline.

Implementing a carbon tax

As with the GST, the most difficult period would be at the introduction of the tax. However, since the systems for reporting are largely set up by the GST, the adjustment to include a carbon tax would be relatively minor.

To provide a learning period for businesses, so that they can establish what their carbon consumption is and how to distribute it to clients, the price could be set at a nominal level such as $1 per tonne for the first year.

At the same time, perverse subsidies for fossil fuels should be removed. Their removal alone would be equivalent to applying a carbon price across the economy, so it is advantageous to do this before fully implementing the carbon tax. I warmly welcome the move in this year's budget to remove vehicle fringe benefit tax reductions for kilometers traveled. This is a great first step. However, all fuel rebates should be removed before fully implementing a carbon tax. Not to do so is equivalent to engaging the gears with the hand brake still on. It may be acceptable to replace this support with other forms of assistant to specific sectors, such as primary producers.

To assist businesses in anticipating the carbon price to charge clients, it could be suggested that one dollar per tonne of carbon tax is equivalent to 0.1% of the sale value. This estimation is based on comparing Australia's energy and process emissions with the revenue raised from GST. To raise equivalent revenue using a carbon tax limited to energy and process emissions would take a little over $100 per tonne. If GST at 10% of the sale value is equivalent to carbon tax around $100 per tonne, that's 0.1% of the sale value per dollar of carbon tax. Clearly this is a rough approximation only to be applied until actual embodied emissions of specific products are established, but it will ease concerns about the scale of the price shifts.

In the second year, a carbon price around $25 - $35 should be set. Upward adjustments could be scheduled for a period of time (giving investors in renewable energy and other low-emissions technology a basis for planning) or they could be made on the basis of whether or not sufficient emissions reductions have been achieved to meet a target. My preference would be for scheduled increases over the first decade, as this would greatly reduce the need for government subsidies to support low-emissions industries. But I accept that it may be more difficult to achieve political acceptance.

Distribution of revenue

Wild promises have been made in relation to compensation for businesses and households, which threaten to cost government considerably more than the carbon tax revenue. These are a consequence of the production-based tax model, which is inherently inequitable and makes everyone feel concerned that they may be unfairly disadvantaged.

A consumption-basis tax removes the unequal impacts on business competitiveness. Shifts in competitiveness will occur between alternative products with different carbon footprints, as this is the intention of the price signal. No producer compensation should be considered necessary under a consumption-basis tax.

The question of whether households should be fully compensated (using 100% of the revenue) or only partly compensated (leaving some revenue for other climate change related programs) is widely debated. Economist Geoff Carmody argues for full compensation designed to maintain total income purchasing power. He compiled the following table illustrating how this could be achieved, depending on the impact of the carbon tax on the consumer price index (CPI).

Table 1. Income tax compensation preserving purchasing power for net CPI effects of a carbon tax (reproduced from Carmody 2011[7]).

2010-11 personal income tax brackets	2010-11 tax rates (a)	Assumed net one-off effect of carbon tax on CPI 1% New tax rates (a)	2% New tax rates (a)	4% New tax rates (a)
Tax-free threshold (b)	$6,000	$6,383	$6,809	$7,824
$6,001 - $37,000	16.50%	15.67%	14.83%	13.16%
$37,001 - $80,000	31.50%	30.82%	30.13%	28.76%
$80,001 - $180,000	38.50%	37.89%	37.27%	36.04%
$180,001 plus	46.50%	45.97%	45.43%	44.36%

(a) Includes Medicare Levy of 1.5%, but ignores low income exemptions and higher income Medicare Levy penalties.
(b) Ignores various low-income concessions, such as the Low Income Tax Offset (LITO).

I would suggest that full compensation is not necessary, but it is necessary to compensate fully those households least able to adjust. Low income households incur a greater

[7] Carmody G. 2011 "Carbon Tax Compensation: Too Costly, Too Complex or Both?" Australian Financial Review, April 2011

proportion of their emissions through nondiscretionary items like utilities charges, and may have little control over the energy consumption of their rented housing. Higher income earners are on average higher emitters, but have greater scope for behavioural change to reduce their exposure to the tax. I would therefore advocate for a compensation arrangement that rebated everyone approximately equally, rather than one which seeks to preserve income purchasing power by providing higher compensation for higher income. Some would argue that this is using the tax as an income redistribution scheme, but it could equally be conceptualized as allocating everyone an equal quota of free emissions which they can use or trade. A suitable system may be simultaneous increases in the tax-free threshold income and all welfare payments and family tax benefits.

The variation in emissions per person is not normally distributed. There is a long tail on the distribution, with a small proportion of people responsible for many times more emissions per person than the average. Because of this, the median emissions per person (i.e. 50% of people responsible for this amount or less) is lower than the average (total national emissions distributed on a per capita basis). It would be possible to compensate households up to the median level, while still reserving some revenue for other purposes. It might be considered that the median level is unnecessarily high, and better to aim for full compensation for the lowest 25% of emitters, with capacity to further compensate people in special circumstances, such as disabled people dependent on energy-intensive equipment or those in remote communities.

Retaining some revenue for government programs could give citizens greater value than returning it to their pockets. By (for example) investing in low-emissions public transport or a smart grid to better accommodate renewable energy sources, government may increase the elasticity of demand for emissions, meaning that targets will be met at a lower carbon price and hence lower cost to people. If all revenue is returned in compensation, people are limited to the alternatives they can afford to put in place themselves.

Other plausible uses for revenue include contributions to international climate change adaptation and clean development, and a national disaster recovery fund as a form of domestic climate change adaptation. Using a proportion of carbon tax revenue for international climate change aid ensures that these funds are genuinely additional to existing aid programs, which is a requirement under the proposed UNFCCC agreement.

Without the benefit of a full analysis of the distribution of impacts on households, I tentatively suggest that a reasonable distribution of revenue might be 60% for household compensation, 20% for international climate change adaptation and clean development assistance, and 20% for domestic programs including building low-emissions transport and power options, disaster recovery fund, and incentive payments for practices which reduce emissions from land use and land use change (discussed below).

Carbon farming and other sequestration activities

Many rural lobbyists welcome a carbon trading system as an opportunity for farmers to receive revenue for good management of their soils and vegetation, where they can demonstrate increases in carbon stocks per hectare.

They incorrectly see opposition to carbon trading as robbing them of this opportunity.

In fact a carbon tax allows more flexible and appropriate means to remunerate farmers. The burden of proof of long-term sequestration required for carbon trading would be a barrier for most farmers. However, revenue raised under a carbon tax can be used to reward behaviour consistent with carbon sequestration, without the need to demonstrate the quantity sequestered.

To illustrate using a parallel example, house insulation is known to be a cost-effective means of reducing emissions associated with home heating and cooling. It made sense for the government to sponsor home insulation programs (notwithstanding any issues with the implementation of the program). It is not necessary to measure the emissions generated by each home before and after insulation, to establish that the program as a whole provides cost-effective emissions reduction. Imagine what the uptake would have been, if householders were required to establish their pattern of emissions over a period of time before insulation, and then demonstrate reductions after insulation on a season-adjusted basis, before receiving any rebate. How many would have taken up the offer?

Yet that is what we are expecting of farmers under a carbon trading regime. It is far better for farmers to be rewarded for adopting improved practices, without having to measure the carbon captured in each individual case. It doesn't encumber their property with ongoing carbon storage obligations. It doesn't hold them liable for unforeseeable carbon losses such as bushfires. And it doesn't corrupt national emissions accounting by off-setting, and therefore not reporting, fossil fuel emissions which actually happened.

Under a carbon trading regime, carbon farming would reduce government revenue by allowing businesses to buy some of their permits from farmers instead of government. This is equivalent in terms of revenue impact to spending a proportion of carbon tax revenue to reward farmers for activities demonstrated to cause sequestration on average. This also keeps the energy and process emissions accounts separate from the land use and land use change emissions accounts, which is as it should be.

International trading and support for emissions reduction in developing countries

Just as carbon trading is perceived to open opportunities for carbon farming, so it is perceived to provide a potential income stream for developing countries with capacity to reduce future sources of emissions or regenerate forests.

In fact, internationally traded permits don't achieve a net benefit by doing this. Yes, some potential emissions in developing countries may be avoided by paying them not to emit. But if this is done through carbon trading, these foregone emissions would be replaced with extra emissions in Australia, over and above our cap. Further, the emissions reductions will not count towards their national targets, because they already count towards ours. We would get their easy reductions, and leave them with the hard yards.

We do need funding flowing from developed countries to developing countries, to assist them to adapt to climate change and to achieve development using low emissions technologies. But such transfers are not equitable if they transfer ownership of the reductions. It is also preferable if funds are directed to those most in need of help, not those most able to demonstrate carbon credits.

It would be better for a percentage of our carbon tax revenue to be tithed to international assistance for low-emissions development and for climate change adaptation measures. These emissions reductions would then be additional to ours, not off-set by ours.

From Australia's perspective, the worst impact of an international carbon trading system is that the Australian price would effectively match the international price. It would not be possible for us to set a carbon price in response to our own demand-price relationship. We would therefore not have control of the rate of emissions reductions in Australia. While some people may see it as a nice solution, for us to continue business-as-usual while buying our carbon permits on the world market, this strategy would maximize our exposure to rising oil prices in response to Peak Oil. By minimizing our carbon price, we also minimize the government revenue available to compensate households and boost low-emissions technology, while maximizing the volume of permits traded and our national debt.

Conclusion

If Australia adopts a production-based carbon trading system, Treasury modeling expects that Australia would meet most of its obligations by buying international permits, without having to reduce emissions here much at all.[8] The problem is, Europe and North America have the same expectation, and as George Monbiot observed[9], there just aren't enough avoidable emissions in developing countries to go around. That is, unless they are packaged into futures and derivatives, that exchange hypothetical future potential sequestration for real present emissions, and ensure that the system is impenetrable to scrutiny. Such a charade can't go on for ever. Michael Porter, director of research for the Committee for Economic Development of Australia, warned 'A carbon finance bubble could eventually dwarf the recent Global Financial Crisis problems'.

In the mean time, any emissions reductions Australia achieves would probably be due to shifting production overseas, with little net impact on global emissions. Voluntary efforts may have dried up in disgust. Our renewable energy industries, and energy efficient technologies, would continue to languish due to lack of profitability. International progress on greenhouse commitments will have stalled, because developing countries will refuse to pull their own weight as well as ours, and will not introduce a system that hurts their export industries. And with them accounting for more than half of current emissions, climate change mitigation will be going nowhere.

I'm not alone in my assessment of proposed carbon trading arrangements. The world's most renowned climate scientist, NASA's James Hansen doesn't mince words, calling carbon trading 'worshipping in the Temple of Doom'. He described the American proposal as 'less than worthless, because it will delay by at least a decade starting on a path that is fundamentally sound from the standpoints of both economics and climate preservation'. Robert Shapiro, Clinton's former undersecretary of commerce, said 'Cap and trade has proved very vulnerable to vested interests, and is therefore too weak to deliver the necessary emission reductions'. During the CPRS development in 2009, the Committee for Economic

[8] Garnaut Review Final Report, Figure 23.6

[9] Monbiot G. 2009. Here is the simple mathematical reason why large scale carbon offsets can't work. The Guardian, 14th July 2009

Development of Australia released a report[10] with contributions from a range of eminent economists, highlighting problems with the CPRS and advocating a carbon consumption tax.

Only a consumption basis tax can avoid emissions leakage and jobs leakage out of Australia. Only a consumption basis tax can deliver an efficient price signal across the whole economy. Only a consumption basis tax can allow us to set a price responsive to Australia's own domestic emissions demand response, independent of the price (if any) applying in other countries. Only a consumption basis tax can provide investment confidence to roll out low-emissions technology fast enough to achieve Australia's equitable contribution to climate change mitigation, and to avoid severe economic impact of Peak Oil. And a consumption basis tax would maximize the revenue available to government to ensure transition to a low carbon economy is as equitable and efficient as possible.

A consumption basis tax would also be easier to sell to voters as it is equitable and does not threaten existing jobs, while maximizing job creation in low-emissions industries. Emphasis should be on shifting tax from goods to bads, with the removal of perverse incentives and direct compensation to households for price impacts. It should be admitted that this is a new tax, but will have no negative impact on any welfare-dependent or low-income household, and is not to raise general revenue. All revenue collected will be used either to compensate households for price shifts or to make low-emissions options available to households and fund climate change adaptation.

[10] Committee for Economic Development of Australia 2009. A taxing debate: climate policy beyond Copenhagen. CEDA Growth No. 61.