Centre for Energy and
Environmental Markets

Submission to the Senate Select Committee on the Scrutiny of New Taxes

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About CEEM:

CEEM is an interdisciplinary research centre working in the area of energy and environmental market analysis and design. CEEM researchers have been investigating environmental instrument such as emissions trading as well as energy and climate policies more generally for the last decade in Australia and internationally. You can learn more of CEEM's work by visiting its website: www.ceem.unsw.edu.au.

About this submission:

This submission is structured according to the information provided about the inquiry.

Emissions Trading Scheme analysis and design represents one of the main research areas within CEEM. Over the last six years work has included detailed analysis of the NSW Greenhouse Gas Reduction Scheme (GGAS) and the European Union Emissions Trading Schemes Emissions Trading Scheme (EU ETS) and work for the divers Australian ETS proposals. Some fifty papers and presentations on emissions trading over this period can be found on the CEEM website. We also run undertake consulting in this area e.g. on auction design. More recently work has been done on environmental taxes e.g. the NSW load based licensing scheme has been evaluated.

This is an area of ongoing work for CEEM and we welcome feedback and comments.
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Content

a) New taxes proposed for Australia, including: (ii) a carbon tax, or any other mechanism to put a price on carbon, and

A coherent and comprehensive policy framework will be required to achieve effective, efficient, and equitable transition to a low carbon economy. Carbon pricing is a challenging but indispensable component of an effective climate policy framework. However, another debate about emissions trading versus a carbon tax may delay action, and based on what climate scientists are arguing timing is critical. Since both instruments have advantages and disadvantages there will be no perfect instrument to choose. However, the specific design features of the chosen instrument are important and should be carefully considered as the choice may determine Australia's climate policy for a long time. In this submission we therefore provide some details on lessons learnt through research and from implementation overseas that may be useful in choosing between an emissions trading scheme (ETS) and a carbon tax.

Economists have long recognized the theoretical equivalency between economic instruments that target quantities (e.g. emissions trading) and those that target price (e.g. carbon tax). In theory, for a given target, the carbon tax under a tax scheme should equal the permit price under an emissions trading scheme. However, in practice, without ideal conditions there may be significant differences in the performance of these instruments.

A comparison of implemented carbon tax schemes (e.g. Norway) with implemented emissions trading schemes (e.g. EU ETS) suggests that the main policy challenge to date has been one of governance rather than instrument choice. Suboptimal ETS targets or carbon tax levels, inappropriate free permit allocation, or tax exemptions for favored emitters can all result in inefficient and ineffective carbon pricing.

Therefore the 'big' policy dilemmas that impeded the attempted introduction of the Carbon Pollution Reduction Scheme (CPRS) are likely to be the same for a carbon tax. The treatment of emission intensive trade exposed industries, transitional arrangements for domestic electricity sector, and compensation to lower-income households for rising electricity prices are all problems that will arise again.

Governance seems to be a major issue that has not been looked at in great detail in the current debate. How can we achieve the most robust and effective policy to reduce greenhouse gas emissions? With regard to good governance, issues such as the separation of powers (e.g. policy recommendations, rule making, regulation and evaluation), transparency (e.g. processes and outcome of policy), and consultation of stakeholders (e.g. at the policy evaluation stage) are very important and should be taken into account carefully.

In order to illustrate some of the advantages and disadvantages of both instruments we list some of the differences between a carbon tax and an ETS:

1. Efficiency under Uncertainty

In his classic paper, Weitzman (1974) demonstrated that when marginal costs of supplying a good (e.g. cleaner air) are uncertain, using a price instrument is more (less) efficient than a quantity instrument when the marginal benefits of that good are relatively flat (steep) compared with the marginal costs.

In the case of global emissions, it has usually been asserted that the marginal benefits are relatively flat because, while CO_2 taxes or cap-and-trade systems affect the flow of emissions,

it is the atmospheric stock of gases that drive climate change damages. The stock changes slowly, because of the long atmospheric residence of CO_2 (about a hundred years on average). Thus, research results by Weitzman suggest that carbon taxes are a more efficient instrument under uncertainty regarding the marginal cost of abatement. The welfare differences between carbon emissions taxes and cap-and-trade systems can be striking. For example, simulations in Pizer (2002) and Newell and Pizer (2003) suggest that a CO_2 tax could result in welfare gains up to five times those of the expectation-equivalent cap-and-trade system

However, if we are approaching a tipping point in global climate, as more scientists are beginning to worry, then the marginal benefits are potentially very steep and an emission trading scheme may be a more efficient option. (Hepburn 2006)

Pezzey and Jotzo (2010) have recently shown, by using the first multiparty
model in the tax-versus-trading debate, that the welfare advantage of an emissions tax over emissions trading in handling marginal abatement-cost uncertainties has been overestimated. However, a tax still has an advantage due to its potential to better handle the uncertainties in the level of business-as-usual emissions. In addition, Pezzey and Jotzo show that the more parties with independent uncertainties are participating in an emissions trading market, the less volatile the trading price is.

2. Efficiency with Lumpy Investments

Abatement actions often reflect the fact that firms cannot easily fine tune their emissions levels. The emissions reductions options may result in emissions levels that are either below or above the theoretical optimum. Without the lumpy asset problem, theory predicts that both ETS and tax schemes equate the marginal abatement cost across all emitters. Due to the lumpy asset problem, this may not always be the case. Emissions trading programs generate more flexibility since they allow some emitters to reduce emissions below the theoretical optimal levels and recoup some of their costs through the sale of the surplus permits. The ETS provides a mechanism to share the cost of abatement (and hence to minimize the cost) amongst firms. Under the tax scheme, there is no such cost sharing mechanism and hence some firms will end up with higher than optimal and others with lower than optimal levels of emissions reduction due to the lumpy nature of investments options.

3. Commitment and Credibility Issues

In many areas of public policy, uncertainties inevitably imply that policy will need to be adjusted over time in response to new technologies, new scientific information, and changed political realities. The discretion to adjust policy is therefore valuable. However, discretionary policy can also result in the following three problems (Hepburn 2006):

a. The ratchet effect. When firms have market power and respond strategically to regulation, discretion results in an incentive for firms to distort decisions to influence future regulation.

This clearly may have happened with the free allocation of permits in the EU ETS where there was an incentive to underperform now to gain a higher licence allocation later. In contrast, price instruments do not suffer from this problem.

b. Credibility problems. If policy needs to induce irreversible investment, a hold-up problem can arise: the regulator has an incentive to adjust policy to achieve other objectives once firms have sunk their investment costs;

As Helm, Hepburn and Mash (2003) argue, the regulator explicitly faces three competing objectives (energy prices, security of supply, and climate change), and has an incentive to

relax emission standards to achieve these other objectives once (irreversible) investment in low-carbon technology has occurred. This can occur with either instrument.

c. Increased cost of capital. Discretion imposes the risk on the private sector that policy will be adjusted (whether optimally or not). When returns on investments are reliant on a revenue stream over a relatively long time horizon, the discretion to adjust policy creates cash flow risks, raising the cost of capital. The price volatility of permits and the effect it has on investments is obviously a big issue in comparing ETS and carbon taxes. Of course, tax rates would also change – but in a more controlled manner.

Obviously, credibly committing to future policy solves all three problems – the distortion in investment decisions by the ratchet effect, the hold-up problem, and the increased cost of capital –, but it also eliminates the flexibility to adjust policy as new information emerges. Determining the optimal trade-off between commitment and discretion involves balancing the benefits of flexibility with the three costs outlined above.

4. International Emissions Leakage and Competitiveness

A carbon tax may induce higher leakage compared to an emission trading scheme, since – barring adjustment – the incentive to leave (the price of carbon) remains constant under a carbon tax; under an ETS, on the other hand, demand for permits (and therefore their price) will fall as companies move outside the country. Thus, a carbon tax may lead to a higher number of companies moving abroad versus an ETS. (Ishikawa and Okubo 2008)

An important consideration for international competitiveness is the arrangement for assisting Emission Intensive Trade Exposed (EITE) industries. Under an emissions trading scheme, such industries are given free permits, which allows them to continue to compete internationally while still maintaining an incentive to reduce carbon intensity (if not the quantity of production) so long as the quantity of free permits are linked to some benchmark or historic emissions and not actual emissions. If the arrangement for EITE industries under a carbon tax is simply to exempt such industries from the tax (as has happened in Germany for coal under the environmental tax reform), then there will be no incentive to reduce any type of emissions/production in these industries. To face a similar incentive to reduce carbon intensity under a carbon tax as under an ETS, the EITE industries would need to have a lump sum tax rebate based on a benchmark or historic emissions similar to the calculation of free permits under an ETS.

5. International linking

Kyoto mechanisms may help to achieve a unique carbon price internationally through indirect linkages of ETS schemes. They may also be used under domestic carbon tax arrangements; however, they will not provide the harmonisation of prices that will drive global efficiency as under an ETS.

Another issue is that, if the usage of international carbon offsets is very large – as was under the CPRS proposal, since the usage was without any restrictions –, it may reduce incentives for long term domestic action and just shift responsibility overseas.

On the flip side, global carbon trading at the international level is vulnerable to ‘hot air’ type situations in which excess permits (from measurement errors or other reasons) can corrupt the entire system. Under a carbon tax, each country’s carbon price would be less affected by these international developments.

6. Coverage

A carbon tax may not cover the whole economy, but rather exempt some industries by either not including them or sheltering them with tax revenue recycling, which will make the tax less efficient. An emissions trading scheme may, in contrast, include more industries and provide free permits in order to reduce the impact. A recent study by Pezzey and Jotzo (2010) shows that the impact of reducing the coverage – by introducing either tax thresholds or free permits – will lower each instrument's possible welfare gain from revenue recycling; this may dominate any tax-versus-trading advantage.

Another aspect to coverage is that, in sectors with a lot of small emitters such as transport, a carbon tax may be much easier to introduce on downstream activities compared to emissions trading.

7. Political Economy

Most people hate taxes unless preceded by the word 'cut'. However, the potential simplicity of a tax may make it easier to sell the approach politically.

A cap-and-trade scheme, once established, is less likely to have its targets degraded by political forces than a carbon tax. But, conversely, it can also see inadequate targets being locked in.

8. Hybrids and Lock-In

Accepting a quantity-based platform for future climate policy does not rule out the possibility of shifting to a hybrid instrument by adding a price ceiling, and possibly also a price floor. Modifying a cap-and-trade system to incorporate some of the price-stabilizing characteristics of an emissions tax can mitigate some of the welfare differences between the pure forms of these two instruments. For example, a hybrid tax-allowance approach, often referred to as a safety valve, could reduce price volatility. A price ceiling caps the costs of compliance and thus reduces the risk of a policy reversal if abatement costs turn out to be injuriously high. The price floor guarantees a certain minimum return on investment in low-carbon technologies, reducing the risk faced by innovating firms. (Hepburn 2006)

Price ceilings and price floors are essentially government insurance products that are guaranteed by all permit holders. In the financial world, innovative financial instruments such as options and futures products exist in order to provide price certainty to businesses and help them to hedge against adverse price movements. Options and futures instruments emerge autonomously without government facilitation and usually represent several levels of "floors" and "ceilings" depending on the expectations and the risk profiles of market participants. The market will price the risk and will create more complete information about the industry's price expectations. Government guaranteed price ceilings and floors could crowd out private providers who would be willing to engage with businesses to mitigate their risks. Even if price ceilings and floors will never be binding (that is, the *equilibrium* price will always be below the ceiling and above the floor), the free government guarantees in the form of price ceilings and price floors have the potential to influence the market prices and hence result in inefficient price signals. Price floors are essentially buy orders in a marketplace at the floor price for unlimited volume of permits and price ceilings are sell orders at the ceiling price for unlimited volume of permits. These orders will interfere with the marketplace and will create false signals at the market, in the sense that motivations behind these prices are purely political and not economic.

9. The Recession

An emissions scheme is counter-cyclical, since it imposes a relatively high marginal cost when emissions increase in a strong economy and a much lower cost when emissions fall in a weak economy. A carbon tax would keep hitting at the same (marginal) rate regardless of the economic conditions.
Of course, emissions intensity probably doesn't change in a recession and we have to be cautious not to snuff out the green incentives from a carbon price – hence the recent discussion of a price floor in the EU.

Note also that different macroeconomic shocks give different outcomes. Warwick McKibbin has done some work showing that an upward shock to growth in one country will benefit other countries less (and perhaps not at all) under global emissions trading than with a price cap or hybrid policy. This is because the growing country will demand more emissions permits, pushing up the global price.
It is easy to see that McKibbin's modelling result is consistent with the analysis here. By symmetry, a negative shock in one country will harm others less under emissions trading than under the price-based alternatives; the same logic applies to sectors within countries. It is easy enough to see, then, that for any economy with a fixed aggregate target, or for the world as a whole, emissions trading will tend to reduce the benefits of booms and the cost of slumps. (John Quiggin's blog)

10. Voluntary Action under a Cap

Voluntary action should be easier to accommodate under a carbon tax compared to an emissions trading scheme. However, there have been proposals on how to allow for voluntary action under a cap e.g. Additional Action Reserve (Twomey et al 2010).

11. Organisational implementation

A difference between a carbon tax and emissions trading may also occur where it is located within the organisation structure of companies. Carbon taxes may be more likely to be located at the finance department compared to emissions trading which may involve more technical departments e.g. environmental officers. Since the know-how on emissions reductions sits more within the technical departments an ETS may be more effective in reducing emissions compared to a tax – where the finance department just ensures that the tax is paid without further investigating reduction options - if communication frictions between departments exist.

(b) the short and long term impact of those new taxes on the economy, industry, trade, jobs, investment, the cost of living, electricity prices, and the Federation;

Over the last couple of years, several Australian institutions (other than the Australian Government and Garnaut Review) have published studies on, for example, distributional burdens of emissions trading scheme on different household income groups (e.g. Melbourne Institute, Climate Institute, KPMG, National Institute of Economic and Industry Research), job impacts (Melbourne Institute), impacts on energy-intensive industries in Australia (Grattan Institute), and electricity prices.[1] The results of those studies may be transferred to reflect the impact of a carbon tax given specific assumptions (e.g. tax is set at permit price, 100% auctioning, same coverage and recycling of revenue). We believe that enough modelling has been done.

The more critical issues are the societal and economic costs associated with climate change that will arise: action is more urgently needed than further modelling.

(c) estimated revenue from those new taxes and any related spending commitments;

Apart from the White Paper and CPRS Bill, many of the studies mentioned above with regard to the distributional impacts have also included revenue estimates and considered revenue recycling options. It is important, when transferring the studies related to an ETS to reflect likely outcomes of a carbon tax, to account for the share of free permits or taxation thresholds/exemptions. Again, in theory both instruments are able to create revenue that may be used to reduce distortionary taxes elsewhere and thus have a double dividend (Aldy et al 2008).

(d) the likely effectiveness of these taxes and related policies in achieving their stated policy objectives;

The main drawback of a tax-based approach rather than an ETS approach is the verification method and transparency required to determine if the tax has achieved the stated objective. Carbon taxes do not guarantee a specific emission reduction outcome, unlike emissions trading, where the quantity of emissions is fixed. Carbon taxes may need to be adjusted (trial and error approach) in order to achieve the emissions target and thus may lose one of their advantages of giving price certainty.
In order to find out what the real reductions of a tax or ETS are you will need to estimate the reference scenario which may be more challenging with the tax if emissions are not reported in a transparent way. ETS schemes usually provide transparent registries which usually include the number of permits surrendered as well as the emissions in a given time period, as this information is relevant to determine the supply and demand side of the market.

[1] See Betz and Owen (2010) for a comparison of different studies with a focus on electricity industry.

There is another aspect that is worthwhile flagging. The ETS will create a business community that will have some companies in favour of high permit prices and some against. If the permit price falls, the government's lack of ambition becomes apparent, therefore an ETS is more transparent and quicker in reflecting governance failure. In addition, 'good corporate citizens' who were betting on a serious carbon price in their investments take a public 'hit'. So you have a driver for the political process to try and keep a 'real price' on carbon that then largely has to involve stronger targets. In contrast, when you introduce a tax, there will be less lobbying for higher carbon taxes. In addition, in an ETS scenario, the public can express a preference for a more stringent target by purchasing and retiring permits.

Experiences with carbon taxes as mentioned above have shown that the major challenge is to set the tax level high enough to achieve the necessary reductions.

For example, the Norwegian carbon tax experience provides some useful insights into the likely effectiveness of a carbon tax. The tax was introduced in 1991 and set at varying levels for different sectors and activities. These varied from around US$50/tonne CO_2 (gasoline and offshore petroleum production) to US$10–25/tonne CO_2 (for most industrial grade fuels), with a significant number of other sectors and emission sources exempt from the tax, many of which were emissions intensive (aviation, fishing, agriculture, land-based gas use, metals refining, cement, and several others). Overall, the economy-wide average carbon tax of US$21/tonne CO_2 was applied to just over 60% of Norway's total CO_2 emissions. One economic study (Bruvoll 2004) found that, over the period 1991–2000, the carbon tax is estimated to have reduced Norway's aggregate CO_2 emissions by only 2.3% below what they would have been without the carbon tax, and only 1.5% for land-based sources – a relatively minor impact. The small effects were partly related to the exemption from the carbon tax for a broad range of fossil fuel intensive industries; exemptions that have been principally motivated by concern about competitiveness.

Research looking at the New South Wales Load Based Licensing Scheme, which is a kind of tax on several water and air pollutants including NOx, SO2, and other local air pollutants, has shown similar problems. Econometric analysis (Ancev, Betz and Contreras 2010) has shown that the tax level in the case of NOx has been set too low to drive any emissions reductions.

(e) any administrative implementation issues at a Commonwealth, state, and territory level;

The institutions we have so far successfully developed are centred on emissions quantity targets and timetables. This approach has hard-won momentum, and a degree of institutional lock-in. Financial institutions within the emissions trading community, including some of the world's major banks and hedge funds, now have a vested interest in ensuring that emissions trading continues. Several small businesses in the field of conservation have also been established in the hope of selling carbon offsets in a future ETS. The costs of learning by doing have been incurred by policy makers as international emissions trading schemes have been proposed (e. g. Carbon Pollution Reduction Scheme), implemented, and iterated.

The institutional switching costs of moving from a quantity-based to a price-based scheme, such as a harmonised tax, seem rather large on the international side. Substantial time and resources would need to be devoted to attempting to shift the current consensus away from targets and timetables. And there is no guarantee that a shift would be achieved, particularly given the environmental movement's resistance to leaving emissions uncapped, and industry resistance to additional taxes. Even if the agreement to negotiate a tax scheme is reached, the time and resource costs required to sort out the devilish details and to implement the scheme should not be underestimated. (Hepburn 2006)

Helm (2005) notes that the institutional burden of constructing an emissions trading scheme can exceed that of a tax. A carbon tax should be relatively easy to incorporate into existing tax systems if no major exclusions and special treatments have to be implemented.

A trading scheme requires additional regulations as it is a designer market and, for example, needs to ensure that the market is competitive. In addition, the market design needs to be done with great care as the ETS may be more vulnerable to evasion, corruption, and manipulation than a carbon tax. The EU ETS suffered from crime in its early years due to tax fraud and phishing scams.

(f) an international comparison of relevant taxation arrangements;

As mentioned above, carbon taxes will only be efficient if they are harmonised internationally. Therefore, achieving international collective action is crucial to organising an effective response to climate change, and this requires the gradual development of institutions, trust, and credibility over time. This is important, because trust and credibility will not be enhanced by large scale, fundamental revisions to the direction of climate policy. As such, practical recommendations need to start from where we find ourselves, rather than where we might like to be.

For a multinational agreement to be successful, any international climate agreement needs to meet a number of key criteria (Aldy and Stavins 2007). These include cost-effectiveness, equity, broad participation, ease of reaching agreement on taxes or emissions targets, verification of member compliance with the agreement, and domestic institutional capability to implement the policy. Aldy et al (2008) address each in turn. They claim that the first three criteria for a successful climate control agreement could, in principle, be met under either tax- or allowance-based approaches. However, for verification of member compliance they see surreptitious policy adjustments posing greater challenges under the tax-based regime (Aldy et al 2008). In addition, multi-national emissions trading schemes are possible – as illustrated by the EU experience –, whereas harmonised taxes have proven to be very difficult to achieve; see the EU efforts prior to the introduction of their ETS.

Lessons learnt from the experiences with the German environmental tax reform are as follows (Schlegelmilch 2005):

- Forge strong alliances that are interested in the revenue e.g. use tax revenue to create new jobs to get unions on their side.
- Integrate small steps of tax adjustments in the law in order to avoid renegotiations every year and to provide certainty for businesses.
- Make the carbon tax part of a general tax reform.
- Aim for revenue neutrality by including spending to improve environmental outcomes.
- Demonstrate early emissions reductions quickly in order to show the effectiveness of the tax.
- Take fairness very seriously.
- Take competitiveness issues into account, but also flag administrative costs for handling exemptions and consider them in the decision making process on such exemptions.

(g) alternatives to any proposed new taxes, including direct action alternatives;

Other policies will be required to provide assurance against the possible failure of any carbon price policy, correct the many potential market failures even with an effective carbon pricing policy, facilitate social consensus towards behavioural change, deal with equity impacts, and drive innovation.

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