

**Senate Standing Committee on Finance and Public Administration**  
**ANSWER TO QUESTION ON NOTICE**  
**Prime Minister and Cabinet Portfolio**  
**Department of Climate Change**  
**Additional Estimates Hearing—February 2008**



**Written question reference:** CC14

**Outcome/Output:** Response to climate change

**Topic:** Relative benefits and costs of an emissions trading scheme to a carbon tax

**Hansard Page:** F&PA 46

**Question:**

Senator IAN MACDONALD—What are the relative benefits and costs of an emissions trading scheme versus a carbon tax?

Dr Parkinson—The previous government considered that issue in the context of the work that was done by the task group on emissions trading. There is an attachment in that, and I think it is covered in chapter 3 as well.

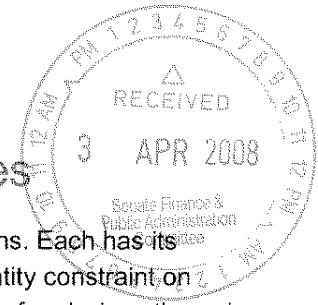
Senator IAN MACDONALD—That is in relation to the last question?

Dr Parkinson—Yes, in relation to the last question. We are happy to provide that to you if you do not have it, but that is where it is.

Senator IAN MACDONALD—Please do.

**Answer:**

See attached.



### 3.3 Comparing market-based approaches

Emissions trading schemes and carbon taxes both impose a price on emissions. Each has its advantages and limitations. A trading scheme sets a price by imposing a quantity constraint on aggregate emissions, while a carbon tax imposes a cost directly on every unit of emissions through the tax system.

Government cannot control both the price and the quantity of emissions reductions at the same time – control over one necessarily affects the other. Therefore, the choice of policy instrument will be guided by the relative importance placed on having greater control over the emissions outcome, or the price (cost) imposed.

#### 3.3.1 Emissions trading schemes

An emissions trading scheme involves the government issuing permits to achieve a measurable emissions reduction task. The number of permits issued (either auctioned or freely allocated) must be less than the amount required under normal 'business as usual' conditions. The scarcity of permits gives them a value.

Firms covered by an emissions trading scheme periodically have to surrender permits to government equal to their emissions. Where firms have different capacities to reduce emissions, they can trade the emissions permits. Firms can improve their capacity to reduce emissions by investing in emissions reduction technologies.

Firms with low-cost emissions reduction options will reduce their emissions until the cost of doing so equals the market price of the permits. Other firms may continue to emit but must buy permits on the market in accordance with their obligations under the scheme, up to the point where the cost of purchasing a permit exceeds the cost of undertaking their own abatement activities.

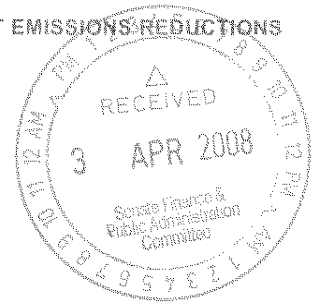
#### 3.3.2 Carbon taxes

Carbon taxes deliver emissions reductions by setting a price for each unit of emissions, and allowing the quantity of abatement to emerge from the market. This contrasts with an emissions trading scheme, where government sets the emissions reduction task and the market response determines the price of each unit of emissions.

The incentive for firms to abate is similar for a carbon tax and an emissions trading scheme under conditions of certainty. A carbon tax would encourage firms with options for low-cost emissions reduction to reduce their emissions and their tax bill. Remaining firms would continue to emit and pay the tax up to the point where it was no longer profitable to do so.

Where the government has full information, a carbon tax and an emissions trading scheme can deliver similar economic and environmental outcomes (see Appendix D). In practice, however, it is rare that the necessary conditions can be met. The choice of policy instrument therefore depends on an assessment of the relative importance of different considerations, including the value of:

- managing emissions reductions with greater certainty
- managing costs to business consistent with the emissions objective



- providing long-term risk management opportunities to business
- accessing least-cost abatement domestically and internationally
- managing the transition to a carbon-constrained world
- minimising administrative and compliance costs
- modifying or adapting the chosen policy instruments over time.

Appendix D explores the relative advantages of a carbon tax and an emissions trading scheme against these design considerations in some detail.

If the policy objective is to fix the cost of emissions reductions, with less focus on the actual reductions achieved, then a carbon tax can be an effective policy instrument.

It is often argued that this is a desirable outcome from an economic perspective (Weitzman, 1974). That is, efficiency losses to society are minimised when there is greater certainty around the costs of a carbon constraint.

### 3.4 Preferred approach

The case for using either an emissions trading scheme or a carbon tax in preference to other forms of intervention is very strong. The Task Group is of the view that there are some policy objectives that are best addressed with emissions trading, and therefore considers that this should be the key instrument to deliver emissions reductions over time.

The key benefit of emissions trading is its focus on the ultimate environmental objective – namely, reducing emissions to a point that mitigates the effects of climate change. As such, emissions trading may provide greater long-term policy credibility, as the community can see the direct link between the policy instrument and the desired environmental objective.

An emissions trading scheme also possesses more options to link with global developments in a carbon-constrained environment. It can provide the capacity to access abatement opportunities at least cost internationally. As noted in Chapter 5, the primary policy instrument being used by other countries for carbon pricing is the development of emissions trading schemes. Some countries with carbon levies have moved these into the emissions trading schemes. While a carbon tax can theoretically interact with international emissions trading schemes, it might be more difficult to gain other countries' acceptance of an Australian carbon tax model.

The international landscape is evolving in a way that suggests reductions in global emissions are more likely to develop with linked trading schemes. Against this background, an emissions trading scheme provides the framework that will afford the greatest opportunity for Australian engagement within a global effort.

Emissions trading also provides government with a simple tool to indicate future emissions constraints and thereby provide business with some guidance about expected future carbon prices. Government can issue long-dated permits that businesses can trade directly. Firms can manage their exposure through the purchase of derivative financial products created from these permits.

However, a carbon tax has some clear advantages over an emissions trading scheme, particularly in relation to managing costs to business in the short term. Therefore, a regime that exploits the relative advantages of both an emissions trading scheme and a carbon tax may be potentially superior to a

pure emissions trading scheme, particularly in the initial phases of a scheme.

Many policy formulations exist, including the well-known McKibbin–Wilcoxon model (McKibbin & Wilcoxon, 2006), that address the tension between price and quantity control objectives through various 'hybrid' model design features.

These combined form, or 'hybrid', models can provide flexibility to address additional policy objectives, though they necessarily involve trade-offs (for example, cost control is only achieved through reduced certainty about emissions reductions).

In most cases 'hybrid' models incorporate binding short-term price caps. If these arrangements are continually rolled over, they may reduce the capacity of the scheme to secure the full benefits of emissions trading. They may also undermine public confidence in the achievement of the ultimate emissions reduction objective.

Chapters 6 and 7 describe a possible emissions trading scheme for Australia that incorporates elements of a hybrid model in the short term, which maximises the flexibility of the policy framework for government.

The model has characteristics that could be modified in the future, to capture more or less of the key elements of an emissions trading scheme or carbon tax, depending on the way the international community moves over time. These modifications could be calibrated in line with developments in the expected damage associated with climate change, and our understanding of the costs of emissions reductions.

International efforts to build emissions trading are likely to incorporate some features that seek to give greater short-term certainty in terms of price and/or economic cost, at least as a pathway towards controlling quantities of emissions. Some of these ideas are explored in chapters 4 and 5.

Although emissions trading will be the key instrument used to reduce emissions over time, complementary policies will be needed. These policies, including those directed toward the development of new low-emissions technologies and the adoption of energy efficiency measures, are explored further in Chapter 8.





## Appendix D

### Comparing carbon taxes and emissions trading

**Chapter 3** briefly noted that, on balance, of the market-based instruments available an emissions trading scheme is likely to be superior to other instruments such as carbon taxes. This conclusion relies upon the assessment that emissions trading appears to provide greater flexibility in terms of:

- more readily accessing opportunities for least-cost abatement through easier linking with emerging international efforts to restrain emissions
- signaling future carbon prices.

While a carbon tax can address these issues, its greatest advantage is its ability to more effectively manage carbon costs, particularly over the short term. This appendix compares the relative strengths of carbon taxes and emissions trading against particular key design criteria.

Where the government has full information, a carbon tax and an emissions trading scheme can deliver similar economic and environmental outcomes (see Box D.1).

In practice, however, it is rare that the necessary information conditions can be met for carbon taxes and emissions trading to be equivalent policy instruments. The choice of policy instrument depends, therefore, on an assessment of the relative importance of various considerations, including the value of:

- managing emissions reductions with greater certainty
- managing costs to business consistent with the emissions objective
- providing long-term risk management opportunities to business
- accessing least-cost abatement domestically and internationally
- managing the transition to a carbon-constrained world
- minimising administrative and compliance costs
- modifying or adapting the chosen policy instruments over time.

#### D.1 Managing emissions reductions and costs to business

It is unlikely that it would ever be possible for government to possess full information regarding abatement costs, and the damage associated with climate change.

Carbon taxes and emissions trading both need to be able to adjust to refined emissions targets as the scientific understanding of the carbon cycle and its impacts are better understood. A carbon tax involves additional uncertainty as the extent to which businesses and individuals would change their emissions behaviour for any given tax rate is unknown. Government would be expected to have to change the carbon tax rate over time to deliver any specific emissions reduction.

If the policy objective is, instead, to make fixed the cost of emissions reductions to business, with less immediate focus on actual reductions achieved, then a carbon tax is an effective policy

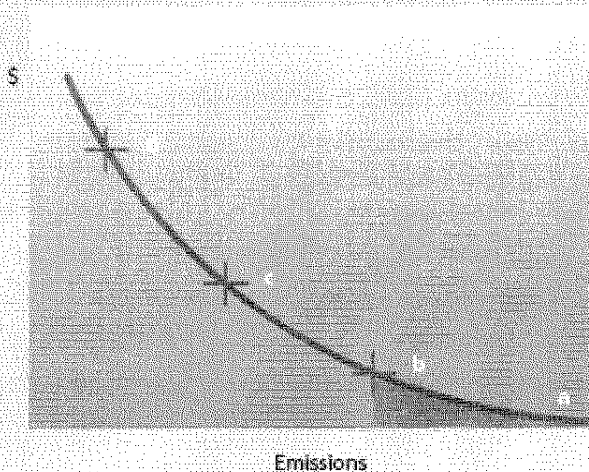
instrument. Moreover, it can be argued that a carbon tax is superior to emissions trading from an economic perspective (particularly in the short run) because it more efficiently deals with uncertainties regarding the likely costs of abatement relative to the benefits from abatement (Stern, 2006, p. 313; Hepburn, 2006; Weitzman, 1974).



For example, in a world of uncertainty, a tax is preferable where the benefits of reducing pollution are likely to change less with the level of pollution than the costs of the pollution reductions. This is likely to be the case in the short run. The benefits of reducing emissions in any single year are unlikely to have very significant impacts (as climate change is dependant on the total stock of carbon equivalent emissions rather than the annual flow of emissions). However, the costs of abatement are likely to increase significantly as firms with fixed capital stock and technology find it harder to reduce emissions.

#### Box D.1 Comparing emissions trading and carbon taxes

##### Marginal costs of emissions reduction



The curve represents the marginal cost of abatement. It describes the additional cost firms would incur to achieve the next unit of emissions reduction. The cost of each unit of additional abatement increases as there will initially be simple, low cost opportunities for firms to abate, but these will gradually be used up, forcing firms to access more costly abatement measures as the size of the emissions reduction increases.

However, as the abatement task increases, more expensive changes or technology will be required. In the absence of policy to reduce emissions, emitters will freely emit up until the point where there is no further private benefit in doing so – that is, point (a).

Where there is certainty as to the marginal cost of emissions reduction, the contribution to global emissions reduction implied at point (b) can be achieved either through an emissions trading scheme that permits the quantity of emissions implied by the vertical line at point (b), or through a carbon tax where the tax rate is that implied by the horizontal line at point (b). Under either approach, the economic cost is the sum of the marginal costs of emissions reduction, indicated by the shaded area.

Similarly, the emissions reductions implied by points (c) and (d) can be achieved through either an emissions trading scheme or a carbon tax.

The choice between the emissions reductions implied by points (b), (c) and (d) ideally should be informed by the marginal cost of emissions.

Total costs (that is, the costs of emissions plus the costs of emissions reductions) are minimised where the marginal cost of emissions reductions matches the marginal cost of emissions – that is, the environmental and economic costs caused by an additional unit of CO<sub>2</sub>-e.

Conversely, in the longer run a permit system is likely to be superior. The longer-term marginal benefits of reducing the stock of emissions are large, as the cost of climate change increases with the size of the stock. The marginal cost of abatement in the long run is also likely to be lower because there is additional flexibility in the capital stock and in technology. In this case, in the long run the benefits of further reductions increase more with the level of pollution than the costs of delivering these reductions.

Ultimately, adopting emissions trading or a carbon tax rests on a choice about the overriding policy objective. If managing costs is given greater immediate weight, a carbon tax can be particularly effective. However, if the focus is on achieving longer-term specific emissions reductions, there are advantages to emissions trading. Short-term policy instruments should be consistent with achieving long-term goals.

## D.2 Providing risk management opportunities to business

Policy frameworks that impose a carbon price to reduce emissions must provide some guidance about expected future carbon prices in order to be fully effective. However, this guidance, particularly over the longer term, will be limited by current assessments of climate change science, meaning there will always be some uncertainty as to the future restrictiveness of government policy.

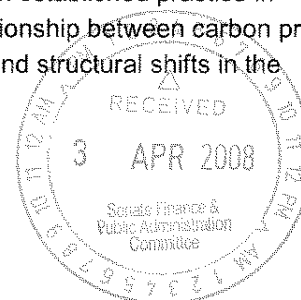
Future policy uncertainty represents a business risk. Governments can limit the risk by providing clear rules and guidelines about how and when policy changes will be decided. Even with such guidance, business will require tools to manage future carbon price risks.

Business may face higher carbon prices due to policy change from higher tax rates under a carbon tax, or reduced permit issuance under emissions trading.

Emissions trading can incorporate design features to help business manage this risk. The government can issue long-dated permits, which businesses can trade directly, or they can manage their exposure through the purchase of derivative financial products created from permits. This enables those investing in emitting industries to gain greater certainty as to the carbon price they may face over the life of their investment by hedging – in effect, 'locking in' a future carbon price.

A carbon tax can only achieve similar outcomes if tradable tax offsets are available. However, such offsets would be unusual – there are currently no markets established for trading in future tax rates. Like banking provisions for emissions trading, tradable tax offsets would add to compliance and administrative costs.

The announcement of tax rates applying over the longer term is not an established practice in taxation. It also presumes a clear understanding of the changing relationship between carbon prices and emissions quantities, and the influence of technological change and structural shifts in the economy on this relationship.





Given these factors, emissions trading provides government with a more established and familiar mechanism to help business manage future carbon price risks.



### D.3 Accessing least-cost abatement domestically and internationally

A key policy objective for Australia is to ensure that our emissions reduction task is comprehensive in its scope, with access to all abatement opportunities. Australian firms should be able to pursue abatement opportunities at least cost domestically and internationally.

Emissions trading and carbon taxes both offer robust frameworks that provide Australian firms with access to domestic offsets and carbon sinks as a means of meeting their emissions reduction obligations. Under emissions trading, permits are available for certified emissions reductions from domestic offsets and carbon sinks. The same outcome can be achieved under a carbon tax by providing tradable tax credits or grants equivalent to the tax rate.

Under any global emissions reduction framework, decisions would need to be made as to the extent, if any, of transfers between Australia and the rest of the world, and the extent of harmonisation of the implicit emissions price.

In advance of a harmonised emissions price globally, there are still considerable benefits to providing Australian firms with access to offshore abatement. Australia may also be able to provide abatement to other economies.

Such international transfers are more likely to be available for Australian companies under emissions trading rather than a carbon tax regime.

The international community appears to be heading towards greater use of emissions trading. Although theoretically there should be scope for gaining recognition of a carbon tax system – it could be based on very similar measurement and verification arrangements to emissions trading schemes – it is likely that the differences in such schemes would complicate international negotiations for mutual recognition.

Other countries may not readily accept an Australian carbon tax regime. This could limit the access of Australian firms to lower-cost abatement opportunities, or limit other countries' ability to tap into lower-cost Australian abatement opportunities or techniques.

### D.4 Managing the transition to a carbon-constrained world

Ensuring a smooth transition to a carbon-constrained world is an important design feature of any policy framework, from both an economic and equity perspective. Transitional tools can be regulatory in nature, though they will typically involve explicit financial transfers. Revenue generated from emissions trading or a carbon tax can provide a financing source for these transfers. Revenue would be generated annually under a carbon tax whereas emissions trading will generate revenue whenever permits are sold rather than freely allocated.

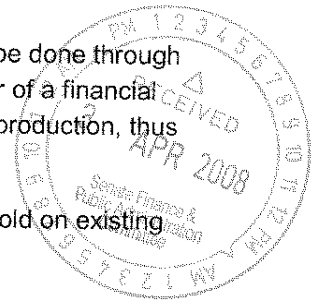
Revenue can be reinvested to support low-emissions technology development through research and development funding. Such measures must be rigorously assessed to minimise the risk that the expenditure does not displace private investments that would otherwise have occurred. Where these measures are effective, they will reduce the cost of transition to a carbon-constrained world over time.



It may also be desirable to direct revenues to industry and households. This could be done through the free allocation of permits. The free allocation of permits would entail the transfer of a financial asset, which, in the case of an emitting firm, would not affect their marginal cost of production, thus retaining the price incentive to reduce emissions.

Similar outcomes could be achieved under a carbon tax by setting a tax-free threshold on existing emissions or through grant payments.

In either case, measures must be carefully considered to ensure that no windfall gains accrue to entities that have the capacity to pass part, or all, of their carbon costs on to customers and suppliers.



## D.5 Minimising administrative and compliance costs

The use of market-based mechanisms such as emissions trading or a carbon tax will create explicit costs for business and government. Both mechanisms require decisions to be made regarding:

- the firms required to measure emissions
- where in the supply chain emissions would be required to be acquitted
- who would check and record the payment of tax or the surrendering of permits
- who would penalise non-compliance
- what those penalties might be.

Policy trade-offs in each of these areas will imply variations in the administrative and compliance cost burden. An emissions trading scheme would require higher start-up costs (the creation of a market) relative to a carbon tax. In addition, emissions trading is likely to have additional ongoing costs as trade needs to be monitored. That said, given that well-established commodity markets and regulatory infrastructure already exist, the ongoing costs might be expected to be low.

A carbon tax would be based on well-established taxation arrangements. However, to the extent that a carbon tax regime is adjusted to capture or mimic benefits achievable under emissions trading, the compliance costs are likely to be similar.

In practice, the administrative and compliance costs of emissions trading or a carbon tax will be determined by the complexity of the design features adopted. The introduction of permits with varying maturities, tradable tax credits, included and excluded sectors, incentive arrangements imposed on excluded sectors, and international linkages, will all add to a scheme's complexity and total administrative and compliance-cost burden.

This complexity will often be a necessary price to pay for an effective, efficient and equitable carbon-price regime. Both emissions trading and carbon taxes will reflect these costs in a broadly similar manner.

## D.6 Modifying or adapting policy instruments over time

The case for using either an emissions trading scheme or carbon tax in preference to other forms of intervention is very strong. While a strong case can be made for a carbon tax, it appears that there are some policy objectives that are more easily addressed with an emissions trading scheme.

The key benefit of emissions trading is its focus on the ultimate environmental objective – namely,

reducing emissions to a point that mitigates the effects of climate change. An emissions trading scheme also possesses easier options to link with global developments in a carbon-constrained environment.

The international landscape is evolving in a way that suggests reductions in global emissions are more likely to develop with linked trading schemes. Against this background, an emissions trading scheme provides the simplest framework for Australian engagement in a global effort.

However, a carbon tax has some clear advantages over an emissions trading scheme, particularly in relation to managing costs to business in the short term. Therefore, a regime that exploits the relative advantages of both an emissions trading scheme and a carbon tax may be potentially superior to a pure emissions trading scheme in the initial phases of a scheme.

These combined form, or 'hybrid', models can provide flexibility to address additional policy objectives, though they necessarily involve trade-offs (for example, cost control is only achieved through reduced short-term certainty about emissions reductions).

In most cases 'hybrid' models incorporate binding short-term price caps. If these arrangements are continually rolled over, they may reduce the capacity of the scheme to secure the full benefits of emissions trading. They may also undermine public confidence in the achievement of the ultimate emissions-reduction objective.

Therefore, a model that incorporates elements of a hybrid model in the short term, with an underlying emissions trading model at its heart, can maximise the flexibility of the policy framework for government.

