

Complementary Climate Change Policies: A Framework for Evaluation

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Abstract

There has been much debate about the role of carbon prices in reducing greenhouse gas emissions in Australia. However there has been far less attention paid to the evaluation of complementary and other non-price policies designed to accompany the carbon price. The purpose of this article is to develop a framework for considering the case for, and effectiveness of, the wide range of existing and proposed complementary policies that are designed to accompany the carbon price in the effort to reduce Australia's greenhouse gas emissions. The article concludes that an effective evaluation of complementary policies should include identifying the market failure the policy is aimed at correcting. The complementary policy should work in conjunction with, not opposition to, other policies aimed at reducing emissions. It should be complementary with the policies of other levels of government and it should also consider issues of efficiency, equity, accountability and adaptability.

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Keywords

Carbon pricing; complementary climate change policies; complementary policy evaluation criteria; greenhouse gas emission reduction; market failure.

Introduction

Nearly 20 years after agreeing to do so in principle (United Nations 1992), the Commonwealth Government has recently passed legislation to introduce a price on greenhouse gas emissions. The Clean Energy Legislation will commence on 1 July 2012 and introduce a price of \$23 per tonne on carbon dioxide equivalent greenhouse gas. This price will rise by five per cent per year until 1 July 2015 (Clean Energy Exposure Bill 2011 Exposure Draft: 112), after which the carbon price will be set in the market created by the Clean Energy Act for pollution permits (ibid: 5).

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Much has been made of the potential for the introduction of a price on greenhouse gas emissions to transform the supply and demand for energy. In July 2011, Minister for Climate Change Greg Combet said:

It [the carbon price] will cut our pollution while still allowing strong economic growth and jobs growth and growth in living standards in the future, and it'll help drive the transformation of the economy to a clean energy future. (Combet 2011)

Despite the rhetorical emphasis on the impending 'transformation' of the Australian economy, the carbon price, being significantly less than the cost difference between the price of coal fired electricity generation and the cost of renewable energy (McKinsey 2008), will have only a modest impact on producer behaviour. Similarly, given the relative price inelasticity of the demand for electricity (Fan et al. 2010), the impact of the carbon price on total electricity use is likely to be small. Furthermore, the carbon price will have no impact on consumer demand for transport fuels as the Clean Energy legislation does not cover such fuels. The introduction of the carbon price will not lead to any increase in the retail price of petrol or diesel.

While there has been a heated political debate between the Labor Government and the Coalition Opposition about the relative merits of relying on a carbon price or so called 'direct action' to reduce greenhouse gas emissions, in reality both parties have proposed a long list of direct regulations, subsidies and buy-backs to achieve their shared goal of a five per cent reduction in greenhouse gas emissions by 2020.

Both Labor and the Coalition have proposed a heavy reliance on incentives to discourage land clearing and encourage reforestation, and both have supported large subsidies to support the development of so-called carbon capture and storage (CCS) technology.

Furthermore, the previous Coalition and current Labor governments have introduced and proposed a wide range of regulatory mechanisms aimed at reducing greenhouse gas emissions associated with particular activities including:

- Introducing the two per cent renewable energy target (Young et al. 2001);
- Banning incandescent light bulbs (news.com.au 2007);
- Expanding the renewable energy target to 20 per cent renewable energy (*Electricity Amendment Act 2008*);
- Introducing energy efficiency standards for electrical appliances (Minimum Energy Performance Standards (MEPS) programs);
- The buyback of up to 2000 megawatts of very high emissions-intensive coal-fired generation capacity as part of the Clean Energy Future Package (Australian Government 2011).

The purpose of this article is to create a framework that can be used to consider the case for, and effectiveness of, the wide range of existing and proposed policies that are designed to accompany the carbon price in the effort to reduce Australia's greenhouse gas emissions.

The article relies on the term ‘complementary’ policies rather than the more partisan ‘direct action’, as while both the Government and the Opposition propose the former, only the Opposition uses the latter term.

What Does ‘Complementary Policy’ Mean?

In the context of climate change policy, complementary policy refers to climate change mitigation measures that are intended to work cohesively with a carbon price mechanism. The design principles for complementary policies have been considered by the Council of Australian Governments (COAG). It has created Complementary Principles for the purpose of reviewing and streamlining their existing climate change mitigation measures and for determining whether the measures complement emissions trading (COAG 2008).

According to these principles, complementary measures should target market failures that are not expected to be adequately addressed by emissions trading. Such market failures can include research and development failures, common use infrastructure issues, information failures and excess market power. Complementary measures should adhere to the principles of efficiency, effectiveness, equity and administrative simplicity.

Complementary measures can target a market failure in a sector not covered by the carbon price. It can also target sectors covered by the carbon price where the market price is insufficient to overcome the market failures that prevents the take up of cost effective abatement.

According to COAG, complementary policies that are regulatory should:

- Be best practice and tightly targeted to the market failure; and
- Be implemented by the level of government best able to deliver the measure.

Finally, according to COAG, policies that have non-abatement objectives such as equity and regional development concerns should have those objectives clearly identified and be the best method of obtaining the objective.

Contradictory Policies

While complementary policies are reasonably clearly defined, there is little discussion in the policy or academic literature of policies that nullify or mitigate the effectiveness of a carbon price. This very different policy category can be called ‘contradictory policies’. It includes explicit and implicit subsidies that encourage the use of greenhouse gas emitting fuels.

In order to move towards a coherent policy framework, and indeed to achieve the ‘least cost abatement’ objective that the Government refers to so regularly,¹ it would be necessary to remove the wide range of existing subsidies and tax concessions that reduce the price paid for fossil fuels in Australia. Table 1 uses the data from the Tax Expenditures Statement (2011) and Commonwealth Budget (2011–12) to show the range and value of the principal concessions. These concessions include Fringe Benefit Tax concessions for company cars and arbitrarily allowing some mining companies to pay lower rates of tax than others.

Table 1: Industry assistance for high emission activities

	2011–12 (millions)	2012–13 (millions)	2013–14 (millions)	2014–15 (millions)	Total (millions)
Concessional FBT treatment of company cars	\$1,220	\$970	\$800	\$690	\$3,680
Exemption from fuel tax for aircraft	\$1,040	\$1,115	\$1,155	\$1,165	\$4,475
Accelerated depreciation for planes, oil and gas assets and commercial vehicles	\$1,040	\$1,115	\$1,155	\$1,165	\$4,475
Exemption from excise for LPG, LNG and CNG	\$510	\$430	\$370	\$310	\$1,620
Fuel Tax Credits Scheme for vehicles used in Mining, agriculture and other non-road purposes	\$5,142	\$5,614	\$5,715	\$5,819	\$22,290
Total	\$8,952	\$9,244	\$9,195	\$9,149	\$36,540

Source: *Tax Expenditures Statement (2011) and Commonwealth Budget (2011–12)*. Reproduced and updated from *Denniss and Macintosh 2011: 2*.

As argued in Denniss and Macintosh (2011: 1), subsidies can sometimes encourage behaviour that is of benefit to society: an example would be financial support for the vaccination of children. On the other hand, subsidies can also embody contradictory climate policies: those in Table 1 are predicted to cost taxpayers more than \$36 billion over the next four years.²

The removal of perverse subsidies such as those listed in Table 1 would seem to be essential for the pursuit of ‘least cost abatement’. If, for political or other reasons, the Government wishes to provide financial assistance to those who produce and consume the most fossil fuels, it should do so via direct cash payment rather than indirect subsidies to the use of fossil fuels. That is, if it is deemed necessary to provide billions of dollars per year to those who contribute the majority of Australia’s greenhouse gases, then such assistance should not be provided in a way that actually encourages them to consume more fossil fuels than would otherwise be the case.

The removal of these contradictory policies would, it seems, be the first step towards the design of an efficient suite of complementary policies.

Price Versus Regulation or Price Plus Regulation?

The use of a price mechanism to mitigate the adverse social or environmental effect of individual behaviour has long been advocated by economists (Pigou 1920). In terms of reducing the impact of emissions, John Howard, Kevin Rudd, Julia Gillard and Malcolm Turnbull have all called, in one form or another, for the introduction of a carbon price. This would provide new incentives for both producers and consumers to change their behaviour. Not only would the removal of contradictory measures save billions of dollars per year, the introduction of a carbon price would raise tens of billions of dollars in new revenue.

Despite the claimed complexity of tackling climate change, the economics of climate change are actually relatively straightforward. The situation in which

the actions of one person impact on an innocent bystander is referred to as an 'externality' because the costs or benefits in question are external to the person making the decision. When an activity imposes costs on another person, for example air pollution, it is called a negative externality. In the absence of government intervention the polluter is likely to emit more pollution than is socially optimal.

A price on pollution forces those who burn fossil fuels to internalise the cost of releasing greenhouse gases into the atmosphere. Further, the costs are likely to be passed on, in whole or part, to those who purchase goods and services that are heavily reliant on polluting forms of energy. While introducing a price on carbon does not prevent people from burning fossil fuels, it imposes a price on those who do so, and on those who use the commodities and services they produce. This discourages the consumption of pollution-intensive products and also encourages producers to switch to other forms of energy to avoid paying the carbon price.

If a carbon price is to be effective, it should reflect the full cost of the harm done to others. It should be highlighted that the economically efficient way to use price to tackle a problem such as climate change should be to set the carbon price equal to the harm done by pollution and then let the market determine the impact on business. In Australia, however, this causation has been reversed. The Australian Government has repeatedly linked the likely size of any carbon price to the potential impact on business. This emphasis on introducing a low, but politically acceptable, carbon price is what necessitates many of the complementary policies discussed above. Indeed, as discussed in the introduction, the proposed carbon price alone may do very little to change producer or consumer behaviour.

The preference of many economists for reliance on a price mechanism³ in order to change consumer and producer behaviour in relation to energy use is based on the argument that price changes are not a coercive form of regulation, and do not interfere with individual choice. By contrast, while the introduction of a ban on air conditioners would almost certainly drive a significant reduction in household electricity use, such a blunt approach would have a number of unintended consequences. For example, it could jeopardise the lives of some elderly people in hot climates without having the desired effect of discouraging other households from running three refrigerators. For consumers, those who value the energy they are using the most highly will continue to consume it, and will pay a premium for the privilege. Those who value other forms of consumption more highly will switch their air conditioners off and spend their money on something else instead.

That said, the combination of a low price elasticity of demand, and the fact that low income households spend a higher proportion of their income on energy, resulted in the Australian Government providing a substantial amount of compensation for households to accompany the introduction of the carbon price. The design of the compensation does not, however, affect the marginal cost of electricity and, in turn, does not diminish the marginal benefit of pursuing increased energy efficiency.

For producers, the argument is similar. It is assumed that those who can improve their production process will invest in doing so to avoid paying higher energy bills. Those who cannot will pass on price rises to their customers, and producers whose consumers refuse to pay higher prices will be forced to shut down.

The reality, in the case of both consumers and producers, is however somewhat more complex than that reflected in economic models. For example, both producers and consumers currently seem to be significantly under-investing in energy efficiency technologies. More Australian homes have air conditioners than have ceiling insulation. Moreover, low income earners who cannot afford to run air conditioners are unlikely to be making rational calculations of the costs and benefits of switching to insulation. Economic models typically base their assumption about consumer and producer choice on the unrealistic assumption that income is distributed evenly.

The Role of Non-Price Policies in Changing Behaviour

Even if all of the contradictory policies that encourage fossil fuel use were removed, and a carbon price consistent with the harm that greenhouse gas emissions cause was introduced, a significant role for complementary policies would still be required. Dr Martin Parkinson, current Secretary of the Department of Treasury, said (when Secretary of the Department of Climate Change) that a carbon price signal is a necessary but not sufficient policy solution to the problem of emission reduction. In 2010, he listed other key measures, such as 'support for the development of new low-emissions energy technologies, integration of climate considerations into transport planning, provision of general energy efficiency information, and addressing split incentives in rental markets'. In 2008, Dr Parkinson argued:

Truly complementary measures should be targeted to areas of real market failure. In all cases, policies need to be well designed and implemented, and need to demonstrate that the benefits of government action outweigh the costs. (Parkinson 2008)

Complementary policies are required to address market failure. This is the situation in which rational individuals left to their own devices will tend to make decisions which may be in their own short term self interest, but will reduce the collective wellbeing of the community in which they live. For example, actions such as recklessly fast driving when in a hurry impose negative externalities on others.

No one would suggest that drivers should be allowed to pay more for a licence that will allow faster driving speeds. Instead, regulatory sanctions up to and

including prison sentences, are used to curtail such reckless behaviour. While much has been made of the need for a price on carbon, the potential role for regulation should not be overlooked by those interested in achieving the goal of least cost abatement.

As a nation, we have used regulation to remove lead from petrol, to remove cigarette advertisements from our televisions and even, as discussed above, to phase out incandescent light bulbs. Well designed regulations can be effective, efficient and equitable. While relying on price provides greater flexibility, relying on regulation typically provides the certainty that business groups often say they require. In the field of climate policy, Table 2 sets out possible areas of market failure where a regulatory response would seem necessary.

Table 2: Examples of market failure requiring a complementary policy response

Split incentives	In some situations, the people who face the costs of certain actions are not those who will benefit from them, either in the short run, the long run or both. For example, if a tenant incurs the cost of installing insulation in a rental property, it is likely to be future tenants who capture most of the benefits. Similarly, if a landlord installs insulation it is the tenant who will benefit from improved amenity and lower electricity bills. In such situations, market forces are unlikely to create optimum outcomes.
Public goods	Some services can only be provided to everyone or no-one — for example, national defence or removing air pollution. That is, it is very difficult to exclude individuals from protection from invasion or the availability of fresh air. In turn, it is virtually impossible for the market to provide such services as there is no need for ‘customers’ to actually pay to receive a service. Much research and development expenditure shares the characteristics of a public good, which is why government investment in R&D is so important.
Information asymmetry	The simple models of human behaviour that often underpin economic analysis typically assume that not only are individuals ‘rational’ in all their decision making but that they can acquire and analyse information costlessly. In reality, of course, people find it very hard to compare the costs and benefits of different products. The inability of people to easily inform themselves is a form of market failure.

Source: *Denniss and Macintosh 2011: 6*

The introduction of carbon pricing will provide polluters with an incentive to reduce their emissions. It is also the policy most likely to increase revenue. Nevertheless, the diverse range of market failures that dominate the way energy is generated and used in Australia means that a carbon price can only ever be one plank in the platform of necessary policy changes.

The Use of Complementary Measures in Other Policy Areas

Complementary policies have a long history in other areas of government policy, where they have augmented the role of price-base measures in encouraging behaviour change. Table 3 lists some examples.

Table 3: Examples of complementary policies in other areas

Smoking	State and Federal and Local Governments have been publicly committed to reducing smoking in Australia for more than three decades. While taxes on cigarettes play an important role in discouraging smoking, governments rely heavily on advertising, restrictions on sale to those under 18, restrictions on which shops can sell them, restrictions on where they can be smoked, and subsidised access to treatments to help people quit.
Alcohol	State and Federal Governments trying to reduce levels of alcohol consumption rely on a combination of taxes, advertising and regulations. The regulations include restrictions on who can sell alcohol, who can buy it (sales to both minors and intoxicated people are prevented) and where it can be consumed.
Unleaded fuel	The Federal Government introduced a range of policies, one of which was to modify the fuel excise arrangements to ensure that unleaded petrol was cheaper than its polluting counterpart. The more important policy change, however, was to require all cars sold in Australia after 1998 to run on unleaded petrol and to make it illegal to put leaded petrol in such vehicles.
Private health insurance	In 1999 the Federal government introduced a 30 per cent private health insurance rebate specifically designed to encourage more people to purchase private health insurance. Soon afterwards, it introduced a range of other policies to encourage the uptake of private health insurance, the most effective of which was to impose a cost penalty for purchasing private health insurance after age 30. Further, legislation required people earning more than \$50,000 per year to take out private health insurance or forfeit one per cent of their taxable income to the government. A mixture of pricing and regulation is evident here.

Source: *Denniss and Macintosh 2011: 3–4*

Similarly, complementary policies will make an important contribution to the development of an economically efficient suite of greenhouse gas emission reduction policies designed to work well in the real world. Successive Australian governments at all levels have favoured such policies, even though at the same time they have been reluctant to abolish contradictory subsidies, and to implement the carbon price that the ‘complementary policies’ are supposed to complement. It would seem that the politics of taking money from polluters is far harder than the politics of spending taxpayers’ dollars on complementary measures. Therefore it is important to have a way of evaluating the effectiveness of such measures.

Developing a Framework to Assess Complementary Measures

Some proposals to reduce emissions may be bad ideas; others will be poorly implemented. Implementation problems have made some complementary policies inefficient, inequitable or even — as with the home insulation scheme — danger-

ous. To make an effective contribution to greenhouse gas reduction, without imposing unnecessary costs on taxpayers, complementary policies will need to be well designed and regularly evaluated. Table 4 provides a framework for that evaluation.

Table 4: Framework for evaluating complementary policies

1	Efficiency — low abatement costs
2	Clear rationale — evident case of market failure
3	Augmentation, not contradiction of other policies
4	Complementarity with other levels of government
5	Equity of impact
6	Accountability
7	Adaptability

The first criterion, *Efficiency*, allows complementary policies to be evaluated through an examination of their cost relative to the reduction in carbon emissions (abatement) they drive. If two policies reduce carbon emissions by 1000 tonnes, one costing \$10,000 and the other costing \$100,000, it is preferable to implement the cheaper policy, unless there are other policy objectives that the more expensive option also delivers.

The second criterion, *Clear rationale*, requires that the policy be directed towards a clear-cut case of market failure. It is to be expected that in a complex world, a range of consumer and producer behaviours will not respond in the desired way to changes in price. Similarly, problems associated with uneven income distribution or flaws in other markets may act as an impediment to the operation of a price signal. When such problems exist, well designed complementary measures can help to ensure that least-cost abatement can still be achieved.

Thirdly, the criterion of *Augmentation, not contradiction* requires that the complementary policy work in conjunction with other policies aimed at reducing emissions, and not cut across them. As the very name ‘complementary’ suggests, such measures are designed to complement the effectiveness of the operation of a carbon price and other existing emission reduction policies. Complementary policies are not designed to offset the operation of existing policies. The Clean Energy Legislation is problematic in this regard. It is designed in such a way that any abatement generated by subsidies for household PV solar panels will simply reduce the abatement effort required by other polluters. That is, the PV subsidies only change who is directly responsible for pollution, not the total amount of pollution generated.

There is a further problem relating to solar panels. Proponents of ongoing subsidies to solar panels often argue that, even though the existence of a fixed national cap on emissions means that emissions are no lower as a result of the installation of the panels, such policies should be pursued on the basis of the

need to develop the solar industry. The link between increasing the demand for imported solar panels and developing the solar industry is, however, often left unstated.

The fourth criterion is *Complementarity with policies of other levels of government*. A specific form of complementarity is the need for Commonwealth, State and Local Government policies to work well together. Not only do decisions about the division and/or overlap of responsibilities need to be well considered, but specific policy proposals from one level of government need to build on what is already occurring in overlapping jurisdictions.

A fundamental flaw with the design of the Carbon Pollution Reduction Scheme (CPRS) and the Clean Energy Legislation is the decision to assign primary responsibility for mitigation (the process of reducing greenhouse gasses) to the Commonwealth while assigning primary responsibility for adaptation (the process of coping with climate change) to the state and local governments.⁴ In addition to ignoring the political reality that elected state and local governments might have a strong desire to implement emission reduction policies, the decision by the Commonwealth to take sole responsibility for mitigation ignored the fact that, in some cases, state and local governments were better placed to design and implement mitigation policies.

Similarly, the current arrangements with PV solar subsidies result in households in some states simultaneously receiving subsidies from both their state government and the Commonwealth Government.

A fifth criterion is *Equitable impact*. While it is generally accepted that the introduction of a carbon price should be designed in such a way as to take account of the impacts on low income earners, there is much less discussion of the need to ensure that complementary policies are equitably designed.

An example of the principle can be seen in the case of state government 'solar feed-in tariffs'. These are simply subsidies paid to people who install PV solar panels. These schemes have been quite generous and lucrative for those who participate, but the high upfront costs tend to exclude low income earners, renters or unit-dwellers. As the subsidy is funded by all electricity users but only received by the minority of people who participate, the distributional consequences of the scheme are determined solely by the demographics of those who participate. An analysis by Macintosh et al. (2010) makes it clear that households in areas of high socioeconomic status are the most likely to be in receipt of the subsidy. The fairness of a feed-in tariff cannot be improved by increasing the uptake of the scheme as, by definition, the subsidy can only be paid to a minority of electricity consumers. That is, if 100 per cent of customers installed PV panels then they would all be in receipt of the subsidy but they would also all be contributing to the subsidy payments. While neither of the above scenarios is likely, it clearly demonstrates why the design of complementary policies is so important. The decision to provide a 20 year price guarantee for the value of the feed-in tariff subsidy, as is the case in the Australian Capital Territory, will create growing inequities over time.

Sixthly, complementary policies must meet the criterion of *Accountability*. Complementary policies have an important role to play in driving behaviour change and, in turn, in reducing emissions. That said, as was seen with the failed home insulation scheme and the Green Loan scheme, complementary policies are not always well designed and/or well implemented. Therefore, accountability has to be an additional criterion for evaluating policies. In order to achieve significant emission reductions at low cost, ensure taxpayers money is well spent, and facilitate the design and implementation of even better policies in the future, it is important for the objectives of complementary measures to be spelt out and for the operation of policies to be monitored against those criteria on a regular basis.

The final criterion is *Adaptability*. While scientists are confident that humans are significant contributors to global warming through the release of greenhouse gases, there is still uncertainty around how rapid the temperature change will be and the extent of the harm that it will cause. We don't yet know the size of the externality. As more research is done in this area the uncertainty will be further reduced. If it is discovered that the size of the externality is widely different from the current response then the complementary measures should be able to adapt to this new information.

Conclusion

While well designed complementary policies should have an important role to play in the pursuit of an efficient and equitable approach to greenhouse gas emission reductions, there is little evidence that the current suite of policies is coherent or efficient.

The simultaneous existence of a price on pollution and explicit subsidies for a substantial subset of emission intensive activities is likely to result in an inefficient, inequitable and unnecessarily expensive approach to reducing greenhouse gas emissions. Indeed, the cost of the existing subsidies for fossil fuel use is of a similar order of magnitude to the total amount of revenue expected to be raised from the introduction of the carbon price.

Further incoherence in the existing combination of price and non-price policies flows from the goal of many so called 'emission reduction policies' being inconsistent with the introduction of a national emissions trading scheme. That is, in the absence of a national emission reduction target, there is no causal link between a reduction in the emissions associated with one sector or activity and an increase in emissions elsewhere in the economy. However, under a national emission reduction target the opposite is true. Under the Clean Energy Legislation the subsidised uptake of PV solar panels, for example, is likely to result in a slight reduction in the amount of coal fired electricity that will be generated. This may, in turn, free up a small number of pollution permits for the coal fired power stations to sell to other industrial polluters. Similarly, the pursuit of sub-national emission reduction targets, such as the ACT's 40 per cent emission reduction target by 2020, will simply free up additional pollution permits for polluters in other states. Such policies cannot, therefore, be seen as complementary to the national scheme.⁵

The existence of such policy problems does not, however, mean that well designed complementary policies do not exist. The introduction of new electrical appliance efficiency standards has, for example, been shown to have reduced emissions at negative cost.

Following the introduction of the Clean Energy Legislation there are two main challenges for policy makers. First, contradictory policies that subsidise the use of fossil fuels need to be removed. Second, the objective of a wide range of local, state and federal policies needs to be clearly stated as a precursor to a comprehensive review of their effectiveness in meeting those goals. The criteria for evaluation that are set out in the latter part of this article could help to ensure more consistent and effective policy outcomes.

Notes

1. The Minister for Climate Change spelt out the economic benefits of a carbon price in June 2011. He said 'A credible policy will find the least cost abatement in the economy; it will put in place economy-wide incentives for changes in behaviour and it will generate revenue for transitional assistance. Only a market-based system can do that — and that is why we intend to place a price on carbon and move to a market based carbon trading system without delay' Combet (2011).
2. For a broader analysis of subsidies and tax concessions that reduce the price paid for fossil fuels in Australia, see Denniss et al. (2011).
3. For example, in Australia see Garnaut (2011) and in the UK, see Stern (2006). A survey was conducted at the 2011 Annual Conference of the Economics Society of Australia, in which 60 per cent of attendees agreed that 'The carbon tax package announced by the Australian government is good economic policy' (Economics Society of Australia 2011).
4. COAG (2007). The constitutional demarcation for responsibilities gives the states responsibility for water management, land use planning, biodiversity, health and emergency services. In hindsight, it seems remarkable that the state governments ever allowed the Commonwealth to take primary responsibility for mitigation (which, when pursued through a carbon price, raises significant amounts of revenue), while the states accepted primary responsibility for the costs of building, modifying and repairing the enormous amounts of social and economic infrastructure associated with the cost of adaptation. See Richardson et al. (2008).
5. The *Clean Energy Act (2011)* does provide for the possibility of a reduction in the number of pollution permits where a robust methodology can be developed to recognise additional voluntary action. The Climate Change Authority can advise the Minister on such a methodology but they are not required to create one and the Minister is not required to accept it. This means that any reduction in pollution permits from this method is highly uncertain.

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