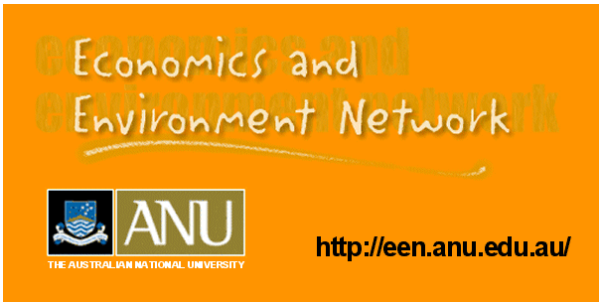

A better Kyoto: options for flexible commitments

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A 'new Kyoto', called for by the Australian government, may well be based on cap-and-trade, but with significant changes. Under the old Kyoto, broad participation and meaningful commitments were difficult to achieve – in part because of uncertainty about compliance costs and the dichotomy between countries with targets and those without. This policy brief examines options for making greenhouse gas commitments under a `New Kyoto' more flexible: intensity targets, sectoral targets, non-binding targets, permit price caps, and linking targets with commitments for technology development. We also touch on market-based options outside the target-based paradigm.

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Summary

- A successor treaty to the Kyoto Protocol after 2012 may well be based around cap-and-trade. A variety of design options exist to counter cost uncertainty, make countries' greenhouse gas commitments more flexible and break down the target/no target dichotomy.
- Intensity targets could link targets to future GDP levels, with indexation customized to each country's circumstances and preferences. They could reduce cost uncertainty for all countries, yield greater expected benefit, and lead to more stringent environmental commitments.
- Non-binding targets could be used as 'entry-level' commitments to draw in a limited number of countries into a post-Kyoto treaty, especially those with high degrees of risk aversion. Their main role would be to help break the political impasse over commitments for developing countries.
- Sectoral targets could cover specific industrial sectors in the largest emitting countries, and so help address carbon leakage concerns in the absence of national caps for all developing countries. Sectoral targets however need to be integrated with broad-based international emissions trading, a topic little researched so far.
- Price caps could help protect permit buying countries from overly high compliance costs, and bring greater expected benefits by reducing uncertainty, especially to permit buyers. However, they can generate large public revenues, and hence political difficulties.
- Commitments for funding of technology development could be recognized alongside commitments to reduce emissions. This would broaden the scope of a future agreement and provide direct links to technology-focused initiatives such as AP6.
- Policy options outside the cap-and-trade (control by quantity) approach include taxes with thresholds (control by price), and hybrid price-quantity models such as the McKibbin-Wilcoxen proposal. However, most international discussion on future climate policy is concerned with cap-and-trade schemes and variants thereof.
- Combinations of flexibility options are possible, creating a continuum between limited and largely risk-free commitments at one end of the scale, and Kyoto-style targets at the other end, though interactions between policies still need to be explored. This increases the negotiation space for a post-2012 treaty, and improves the chances of achieving broader participation, including by developing countries.

Policy context

There is renewed urgency to forge a meaningful international climate change agreement. The Australian government has called for a 'new Kyoto', and the Prime Minister has announced a task group on emissions trading, to 'advise on the nature and design of a workable global emissions trading system in which Australia would be able to participate' (Prime Minister, media release 10 December 2006). Despite criticisms of Kyoto's target-based approach, the political momentum is with cap-and-trade for greenhouse gas control, with Europe and a number of US states going down that path. A 'new Kyoto' arising from the UN process, for the period after 2012, would very likely take cap-and-trade as a starting point, and one arising from the Asia-Pacific Partnership (AP6) may well too.

To achieve broad participation and meaningful commitments, the rules of the game need to be right. Shortcomings of the Kyoto approach are uncertainty about the future cost of complying with a particular commitment, and the dichotomy between countries with emissions targets and those without. But there are a variety of design options to counter cost uncertainty, make greenhouse gas commitments more flexible and break down the target/no target dichotomy.

This policy brief looks at intensity (indexed) targets, sectoral targets, non-binding (opt-out) targets, permit price caps, and linking targets with commitments for technology development. We also touch on market-based mechanisms that do not have targets at their core. Here we do not discuss equity implications of each instrument, and focus on their use in an international agreement rather than in domestic policies. The degree of analytical research that has been done differs between the options. We refer to our own research, as well as selected contributions in the literature.

Intensity targets

Intensity targets would be framed in terms of emissions intensity, that is, emissions per dollar of GDP. Intensity targets (also referred to as dynamic, indexed, relative, or rate-based targets) were originally conceived as a way to engage developing countries in the Kyoto Protocol (Baumert et al. 1999).

They received renewed attention since the Bush administration's pledge to reduce the greenhouse gas intensity of the US economy by 18% from 2002 to 2012 (under the 'Climate Change Initiative'). Recently, China announced a goal to reduce energy intensity by 20% from 2006 to 2010 (under the 11th 5-year plan), and the Canadian government plans to set goals for future emissions intensity (under the 'Clean Air Act' of 2006). Clearly, intensity targets can be politically more acceptable than Kyoto-style absolute targets.

The main attraction is that intensity targets are more generous if economic growth is fast, with extra permits to accommodate higher emissions. Conversely, the target is tighter in absolute terms if economic growth is slow.

An intensity target would not need to be indexed one-to-one to GDP. Rather, the degree of indexation could be varied according to

countries' preferences and circumstances (Ellerman and Sue Wing 2003). There could be a continuum from Kyoto-style absolute targets, through partially indexed targets, to one-to-one indexation or even 'super-indexation'.

We have developed a theoretical formula for the optimal degree of indexation, and empirically modeled a hypothetical 2020 global greenhouse gas treaty, under multiple uncertainties (Jotzo and Pezzey 2006b). Optimal indexation depends on the strength of the emissions–GDP linkage in each country, and the stringency of its target relative to business-as-usual.

The modeling shows that optimal indexation varies greatly between countries, especially if there is full coverage of greenhouse gases and sources. This is because the link between emissions and GDP tends to be much stronger in the energy sector than in other parts of the economy. For Australia, optimal indexation in an illustrative modeling scenario would be 0.8, so that a 1% rise in Australia's GDP above expectations would result in a rise of 0.8% in Australia's emissions target. Specific results depend on the target's coverage and stringency, and expected GDP-emissions linkage.

The expected benefits from an international emissions trading treaty could be significantly higher under intensity targets, because of reduced risk of over- or undershooting expected costs. And if governments are risk-averse regarding future compliance costs, commitments under intensity targets could be more stringent.

A criticism of intensity targets is that the amount of emissions allowable under a treaty with intensity targets is not fixed, so uncertainty is shifted away from costs and on to emissions. However this is not an effective argument against target indexation in the greenhouse case, because 1) intensity targets may make more stringent targets possible in the first place; 2) GDP fluctuations tend to cancel out between countries; and 3) any over- or undershooting of desired emissions at some point in time can be compensated by periodically adjusting targets.

Other concerns are that intensity targets always 'look' more stringent because of the underlying decline in emissions intensity, and so could be used to obfuscate lack of ambition – emissions levels may still increase despite a reduction in emissions intensity. This could be countered by formulating targets as absolute amounts, plus an indexation component that is linked to future GDP.

Multi-country sectoral targets

Targets could be set for specific sectors or industries in the major producing countries, as an alternative or complement to Kyoto-style national targets. Sectoral targets could apply in energy intensive industries such as iron and steel, aluminium, chemicals, cement, and pulp and paper. Their level relative to the baseline could differ between sectors and countries, and could include different features such as indexation or non-bindingness (see the recent proposal by the Centre for Clean Air Policy, Schmidt et al. 2006).

The sectoral approach would allow targets to be tailored to each industry's circumstances, and they are likely to be easier to negotiate than country-level targets. Only the major players in each industry would need to be covered for the scheme to be effective, and only a small number of developing countries would need to be brought on board in each of the main industrial sectors. For example, just three countries (China, India and Brazil) account for over 90% of all developing countries' emissions in the iron and steel sector (Schmidt et al. 2006). Sectoral targets could thus help address the problem of relocation of industrial production ('carbon leakage').

Sectoral targets however are no stand-alone solution, as they are likely to only cover a modest share of total emissions. They may work for traded energy intensive goods such as metals, chemicals and cement, but would be more difficult to apply to electricity generation, and are even less suitable for emissions sources such as residential energy use, transport, or agriculture.

Further, sectoral targets will mean different required levels of effort in each country and sector. For overall cost effectiveness, it will be imperative to link sectoral targets to wider emissions trading, to achieve equalization of marginal abatement costs. Sectoral targets therefore would work best if integrated with overall national targets in countries that take on such commitments, and fully linked to international emissions trading in countries that only take on commitments for some sectors. For example, under a post-2012 treaty key developing and industrializing countries might have targets only for selected sectors, while for developed countries the corresponding sectoral targets would be added into a national cap.

Non-binding targets

Non-binding targets would allow some countries to opt out of their target and the cap-and-trade scheme, without penalty. The idea of non-binding targets (also referred to as 'opt-out' or 'no-lose' targets) is squarely aimed at bringing developing countries into a future climate treaty (Philibert 2000). Non-binding targets feature in various proposals for a post-2012 climate policy architecture, typically as a stepping stone for developing countries on the way to binding targets further down the track.

The rationale for non-binding targets is that for countries with ample abatement options, taking on a fairly generous greenhouse target should be profitable, as the revenue from selling spare permits should outstrip the cost of freeing up those permits. Thus if all goes well, the non-binding target would indeed be enacted. Non-bindingness creates an 'emergency exit', to be used if the target agreed earlier turned out too hard to achieve. Non-bindingness can apply only to a few countries, as binding targets are needed for buyers in order to guarantee demand in the permit market.

Non-binding targets could to a large extent eliminate the risk to a country of incurring a loss from an emissions commitment. This makes them an attractive option for bringing highly risk-averse countries on board of a post-2012 treaty, and also for countries where institutional foundations are still being developed.

Our modeling (Jotzo and Pezzey 2006a) shows that a non-binding target could be much more stringent in level terms than a conventional target that is equally acceptable to the country in question. However, the reduction in risk to countries with the non-binding target goes hand in hand with the risk that the treaty parties collectively miss out on access to low-cost abatement options in the country in question, if the target is not enacted. The effect of non-binding targets on expected global benefits could go either way. We conclude that non-binding targets would be best used to help draw a limited number highly risk-averse countries into a future agreement, ideally with reasonably generous target levels, to ensure a high probability of the target being enacted.

In their implementation, non-binding targets would provide additional challenges because of increased regulatory uncertainty for domestic industries. On the other hand, they could help countries where progress with institution building is uncertain. Opt-out provisions may be relevant not just if emissions trajectories turn out higher than expected, but also if domestic arrangements for emissions accounting and control policies fail.

Price caps

A price cap would set up a maximum or capped price (also referred to as a ‘safety valve’ or `trigger price') for permits traded in the international market, by making additional permits always available at the 'cap' price. This would protect buyers of emissions permits from the risk of excessive compliance costs. In existing permit trading schemes, compliance penalties in some respects act as de-facto price caps. Price caps were earlier promoted in the United States to help make Kyoto ratification possible, by limiting US exposure to the risk of overly high compliance costs.

A price cap addresses the main economic argument for control by price instruments (emission taxes) rather than by quantity instruments (tradable emission permits) for greenhouse gas control; it is in effect a hybrid of the two types of instrument. Under uncertainty, getting the cost of emissions control wrong (as can happen with permits) has far greater efficiency costs than getting the amount of emissions released into the atmosphere wrong (as can happen with taxes) That is because climate damages are caused by the huge accumulated stock of greenhouse gases in the atmosphere, rather than just a few years' emissions.

Earlier modeling analyses of the price caps showed very large gains in expected benefits compared to pure permit trading, especially if the combination of targets and price cap were set so that the cap applied most of the time (Pizer 2002). Our own analysis (Jotzo 2006) confirms that significant efficiency gains can be achieved, especially if a minimum price were set alongside a maximum price (price floor and ceiling). Yet the gains estimated in our multi-region model are much smaller than those in single-region models, because the permit price tends to be less volatile with a greater number of participants in trading.

Price caps could result in large public revenues from the sale of additional permits into the market. Such revenue would need to be

distributed among participating parties, or spent on agreed activities. This could complicate international negotiations, or even destabilize agreement if the amounts involved turn out to be very large. The closer to the expected or desired permit price that the price cap is set, and so the closer the system is to price control, the greater are expected revenues and resulting political difficulties.

Price caps would increase the chances for a meaningful post-2012 international climate agreement, by providing a safeguard for countries with ambitious targets. However, their role probably will need to be confined as a 'safety valve' rather than as de-facto price-based control, because of the political difficulties inherent in large revenues.

Commitments for technology development

A flexible future climate agreement could incorporate funding commitments for climate change related activities, and this link is increasingly recognized as an integral part to an effective future regime. For example, the São Paulo proposal (BASIC 2006), one of many proposed roadmaps for a post-2012 climate policy architecture, suggests that rich countries should have the choice of fulfilling part of their overall commitments by financing technology development or climate change adaptation measures in poorer countries.

The advantage of such an approach is that it would recognize efforts that do not result in short-term emissions reductions within each country, but that help pave the way to long-term global reductions. It could help build a bridge between efforts under the UNFCCC and technology-focused initiatives such as the Asia-Pacific Partnership on Clean Development and Climate (AP6), and provide incentives to adequately resource such initiatives. For example, it could immediately reward efforts by Australia to develop carbon capture and storage (CCS) technology, or efforts to improve renewable energy technologies.

Agreeing on what efforts and funding are eligible may prove difficult. A simple solution would be to set up global funds along the lines of the Global Environment Facility and only count contributions made to these funds, but that would forego setting incentives for action at the national, bilateral or regional scale. If funding and emissions commitments were to be traded off, then an 'exchange rate' would be needed between dollars spent and emissions reduction commitments undertaken.

Policy options outside the cap-and-trade approach

For completeness, we list three policy options which are not flexible commitments within the Kyoto Protocol, but are closely related to some options above. First, *pure taxes* on greenhouse gas emissions are in principle better than tradable permits, because as noted above, the benefit of controlling the emission price, by using a tax, is greater than the benefit of controlling short-term emission quantities, by using tradable permits. However, a pure tax generates huge revenues which have proved to be politically unacceptable, and form one

reason why the Kyoto Protocol uses permit trading.

Second is a proposal by Pezzey (2003) for an *emission tax with thresholds*. Under this, a tax is paid only above thresholds, and subsidies are paid for emissions below thresholds. Thresholds can then be distributed across and within countries in order to yield about the same revenue as a roughly equivalent permit trading scheme. This could defuse political opposition to emission taxation.

Third is the scheme by McKibbin and Wilcoxen (2002) for a system of short-term and long-term permit trading within a country, which acts as a price-quantity hybrid. It has elements of the price-cap schemes above, though has no international permit trading. Certainty about the maximum short-term permit price is one of its attractions.

However, most international discussion on climate policy is concerned with cap-and-trade schemes and variants thereof, rather than brand new schemes such as taxes with thresholds, or McKibbin & Wilcoxen's Blueprint.

Combining flexibility options

The options for flexible emissions targets discussed above could be combined (see figure below). For example, non-binding or sectoral targets could be framed in terms of intensity, and sectoral targets could be non-binding – which would make them conceptually equivalent to extending the Clean Development Mechanism (the Kyoto Protocol's offset mechanism) to the sector-level, as has also been proposed.

This makes for a broad spectrum of commitments, from highly flexible ones that apply to only parts of the economy at one end of the scale, to Kyoto-style national targets at the other. Each country could negotiate a different mix of commitments, to suit its circumstances and preferences.

Careful mechanism design would be essential, as greater flexibility brings greater complexity. Issues of potential interaction between flexibility options have not yet been fully researched. Negotiations would also be more complex as they range over more dimensions.

These caveats aside, it is clear that the target-based approach does not need to be nearly as rigid as under the pre-2012 Kyoto Protocol. Flexible commitments greatly improve the scope for agreement, by better accommodating developed countries' needs and by providing options for entry-level commitments by developing and industrializing countries. Consequently, flexible commitments around cap-and-trade hold promise for a 'new Kyoto', and indeed a 'better Kyoto', whether it arises from the UNFCCC process or under the AP6 umbrella.

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Combining flexible commitments